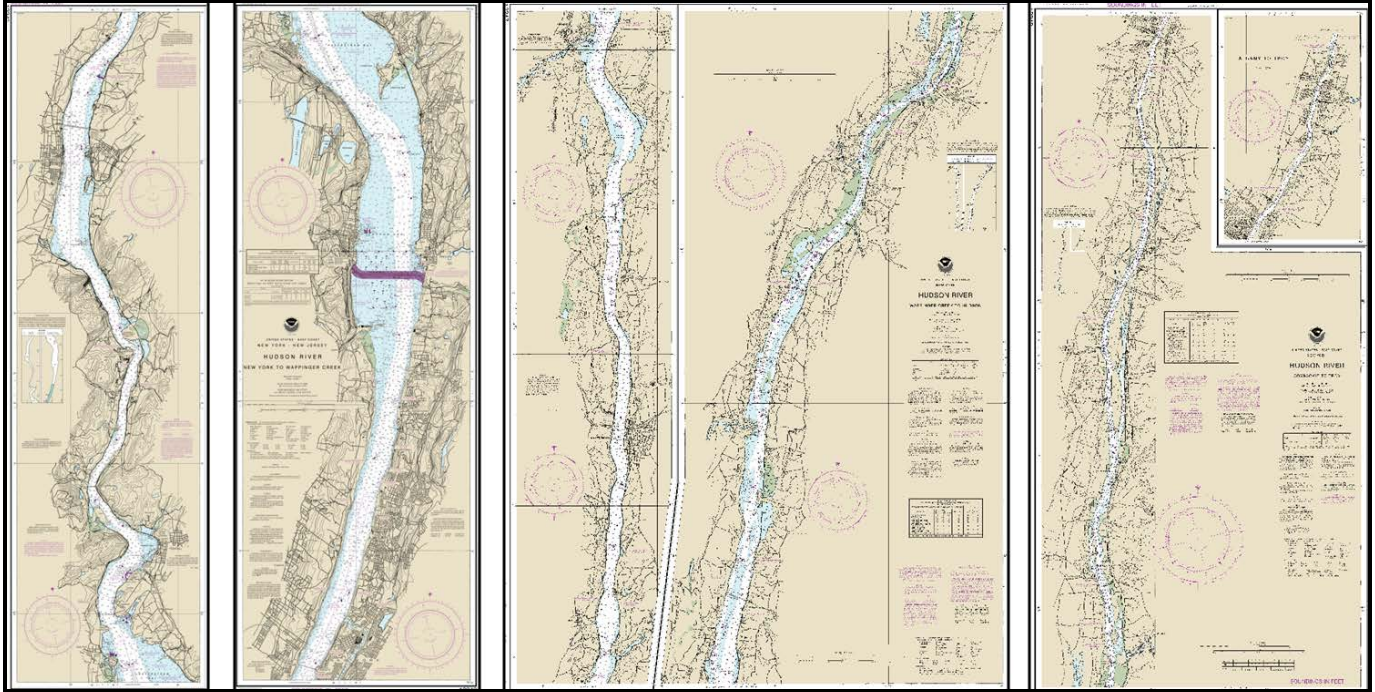


Ports and Waterways Safety Assessment

Workshop Report

Hudson River, New York



United States Coast Guard
Marine Transportation Systems Directorate



Providing Navigation Safety Information
for America's Waterways Users

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Background and Purpose

The United States Coast Guard (USCG), Marine Transportation System Directorate, is responsible for developing and implementing policies and procedures that facilitate commerce, improve safety and efficiency, and inspire dialogue with port and waterways users with the goal of making waterways as safe, efficient, and commercially viable as possible.

Through the 1997 Coast Guard Appropriations Act, the Coast Guard was directed to establish a process to identify minimum user requirements for new Vessel Traffic Service (VTS) systems in consultation with local officials, waterways users and port authorities, and also to review private / public partnership opportunities in VTS operations. The Coast Guard convened a National Dialogue Group (NDG) comprised of maritime and waterway community stakeholders to identify the needs of waterway users with respect to Vessel Traffic Management (VTM) and VTS systems. The NDG was intended to provide the foundation for the development of an approach to VTM that would meet the shared government, industry, and public objective of ensuring the safety of vessel traffic in U.S. ports and waterways, in a technologically sound and cost effective way.

From the NDG came the development of the *Ports and Waterways Safety Assessment (PAWSA) Waterways Risk Model*, and the *PAWSA workshop process*. PAWSA is a disciplined approach designed to identify major waterway safety hazards, estimate risk levels, evaluate potential mitigation measures, and set the stage for the implementation of selected risk reduction strategies. The process involves convening a select group of waterway users and stakeholders and facilitating a structured workshop agenda to meet the risk assessment objectives. A successful workshop requires the participation of professional waterway users with local expertise in navigation, waterway conditions, and port safety. In addition, stakeholders are included in the process to ensure that important environmental, public safety, and economic consequences are given appropriate attention as risk interventions are identified and evaluated.

The long-term goals of the PAWSA process are to:

- 1) Provide input when planning for projects to improve the safety of navigation,
- 2) Further the Marine Transportation System (MTS) goals of improved coordination and cooperation between government and the private sector, and involving stakeholders in decisions affecting them,
- 3) Foster development and/or strengthen the roles of Harbor Safety Committees within each port, and
- 4) Support and reinforce the role of Coast Guard Sector Commanders/Captains of the Port (COTP) in promoting waterway and vessel traffic management activities within their geographic areas of responsibility.

In total, 58 ports/waterways have been assessed using the PAWSA process. The risk assessment process represents a significant part of joint public-private sector planning for mitigating risk in waterways. When applied consistently and uniformly in a number of waterways, the process is expected to provide a basis for making best value decisions for risk mitigation investments, both on the local and national level. The goal is to find solutions that are cost effective and meet the needs of waterway users and stakeholders.

PAWSA Waterway Risk Model and Workshop process

The PAWSA Waterway Risk Model includes variables dealing with both the causes of waterway casualties and their consequences. In the Waterway Risk Model, risk is defined as a function of the probability of a casualty and its consequences. The diagram below shows the six general risk categories, and corresponding risk factors, that make up the Waterway Risk Model.

Waterway Risk Model					
Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
Deep Draft Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personnel Injuries	Health and Safety
Shallow Draft Vessel Quality	Volume of Small Craft Traffic	Water Movement	Dimensions	Petroleum Discharge	Environmental
Commercial Fishing Vessel Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic



- **Vessel Conditions** – The quality of vessels and their crews that operate on a waterway.
- **Traffic Conditions** – The number of vessels that use a waterway and how they interact with each other.
- **Navigational Conditions** – The environmental conditions that vessels must deal with in a waterway.
- **Waterway Conditions** – The physical properties of the waterway that affects vessel maneuverability.
- **Immediate Consequences** – The instantaneous impacts to the port as a result of a vessel casualty.
- **Subsequent Consequences** – The longer-term impacts felt days, months, and even years afterwards.

Workshop activities include a series of discussions about the port/waterway attributes and the vessels that use the waterway, followed by completion of work books to establish baseline risk levels, evaluate the effectiveness of existing risk mitigations, and identify additional risk intervention strategies to further reduce risk in the port / waterway. Work book 1 is used to numerically evaluate the baseline risk levels using pre-defined qualitative risk descriptions for pre-defined risk factors. Work book 2 is used to assess the expertise of each other with respect to the risk categories in the model. Those expertise assessments are used to weight inputs obtained during the other steps in the workshop process. Work book 3 is used to evaluate how effective the mitigation strategies are at reducing risks, and to determine if the risks are well balanced or not. For those risk factors where risk is judged to be not well balanced by existing mitigations, participants use work book 4 to identify additional risk intervention strategies and then evaluate how effective those new strategies could be at reducing risks.

Hudson River PAWSA Workshops

PAWSA workshops to assess navigation safety on the Hudson River were held in Poughkeepsie, New York on 7-8 November 2017 and in Albany, New York on 15-16 November, 2017. The purpose was to bring waterway users, stakeholders and members of the Hudson River community together for collaborative discussions regarding the quality of vessels and crews that operate on the waterway; the volume of commercial, non-commercial and recreational small craft vessel traffic using the waterway, and the ability of the waterway to handle current and future increases in traffic volume levels.

The goal of the Hudson River PAWSA workshops was to foster improved coordination and cooperation among government and private sector stakeholders, provide waterway community members with an effective tool to evaluate risks to safe navigation, and begin work toward long term solutions tailored to local circumstances.

The sponsor of the Hudson River PAWSA workshops was Rear Admiral Steven Poulin, Commander of the First Coast Guard District. Admiral Poulin conducted a press conference before each workshop explaining his reasons for sponsoring the workshops, which included a record number of comments the Coast Guard received in response to its 2016 Advanced Notice of Proposed Rulemaking (ANPRM) seeking public input on a proposed rule on new anchorage grounds on the Hudson River. Admiral Poulin described the Hudson River as a national treasure, and he intended for the PAWSA process to provide the Coast Guard with a better understanding of the risks on the waterway and what measures may be implemented to address those risks.

Admiral Poulin opened the workshop proceedings by welcoming participants and observers, explaining the Coast Guard's commitment to process transparency, to help identify risks on the river and what current and potential mitigations may reduce risks, and to work collaboratively with all stakeholders to find the best solutions possible to protect the Hudson River and vessels operating on it. He emphasized the PAWSA process was not a substitute for rulemaking, rather it would better inform the Coast Guard to understand the risks and determine what the next steps might be at reducing those risks.

Over the two day workshops, participants discussed and then numerically evaluated each of the 24 risk factors in the PAWSA model. Baseline risk levels were first evaluated using pre-defined qualitative risk descriptions for each risk factor. Participants then discussed existing risk mitigation strategies, evaluated how effective the mitigation strategies were at reducing risk, and then determined if the risks were well balanced. For those risk factors not balanced by existing mitigation, the participants discussed additional risk mitigation strategies and evaluated how effective they would be at reducing risks if implemented.

The results of the baseline risk levels, existing risk mitigations, additional risk intervention strategies, and participant comments and observations are outlined in this report. Nautical charts of the Hudson River were displayed for reference, and to annotate geographic locations associated with participant comments and observations.

Conclusion

The goals of a PAWSA workshop are to further the Marine Transportation System objective of improved coordination and cooperation between government and the private sector, and to involve stakeholders in decisions affecting them. A PAWSA also provides the Coast Guard and members of the waterway community with an effective tool to evaluate risk and work toward long term solutions tailored to local circumstances that are both cost effective and meet the needs of waterway users and stakeholders. In support of this goal, this report should be viewed as a starting point for continuing dialogue within the Hudson River maritime community.

As discussed in the report, two separate workshops were held in Poughkeepsie and Albany, NY. Over each two day workshop, participants discussed, and then numerically evaluated, each of the 24 PAWSA model risk factors, considered impacts of current mitigations, and proposed additional mitigations to reevaluate potential impacts on the highest remaining risk categories. After workshop participants considered existing risks and mitigations, the highest areas of concern (and scores) included:

- Small Craft Quality (8.5);
- Petroleum Discharge (8.0);
- Economic (7.6);
- Obstructions (7.1);
- Aquatic Resources (6.9); and
- Visibility Restrictions (6.6).

Some of the most commonly recommended additional participant proposals included: creating a Hudson River Safety Committee (HRSC); increasing boating safety education (training, brochures, licensing); providing greater anchorage regulation clarity (creating new anchorage grounds w/ time limits, implementing Regulated Navigation Areas (RNA) to ban anchoring); improving real-time information dissemination (bridge cameras accessibility, VHF radio use/ carriage requirements, Automatic Identification System (AIS) blind spots/ gaps); increasing enforcement; and improving emergency spill response (increasing capabilities, identifying sensitive areas, increasing federal agencies on-river presence, prohibiting oil barges from laying at anchor). Though reduced by the additional potential mitigations discussed by participants, the final remaining significant risk factors (and new scores) were:

- Small Craft Quality (6.3 from 8.5);
- Petroleum Discharge (6.5 from 8.0);
- Economic (7.1 from 7.6); and
- Aquatic Resources (6.0 from 6.9).

Besides our continuing effort to support the stand-up of the HRSC the Coast Guard has not yet made any decisions regarding establishing anchorages or using other waterways management tools to manage navigation risk on the Hudson River. The Coast Guard will use this PAWSA report, together with other information, to determine whether, and to what extent, regulatory actions are needed.

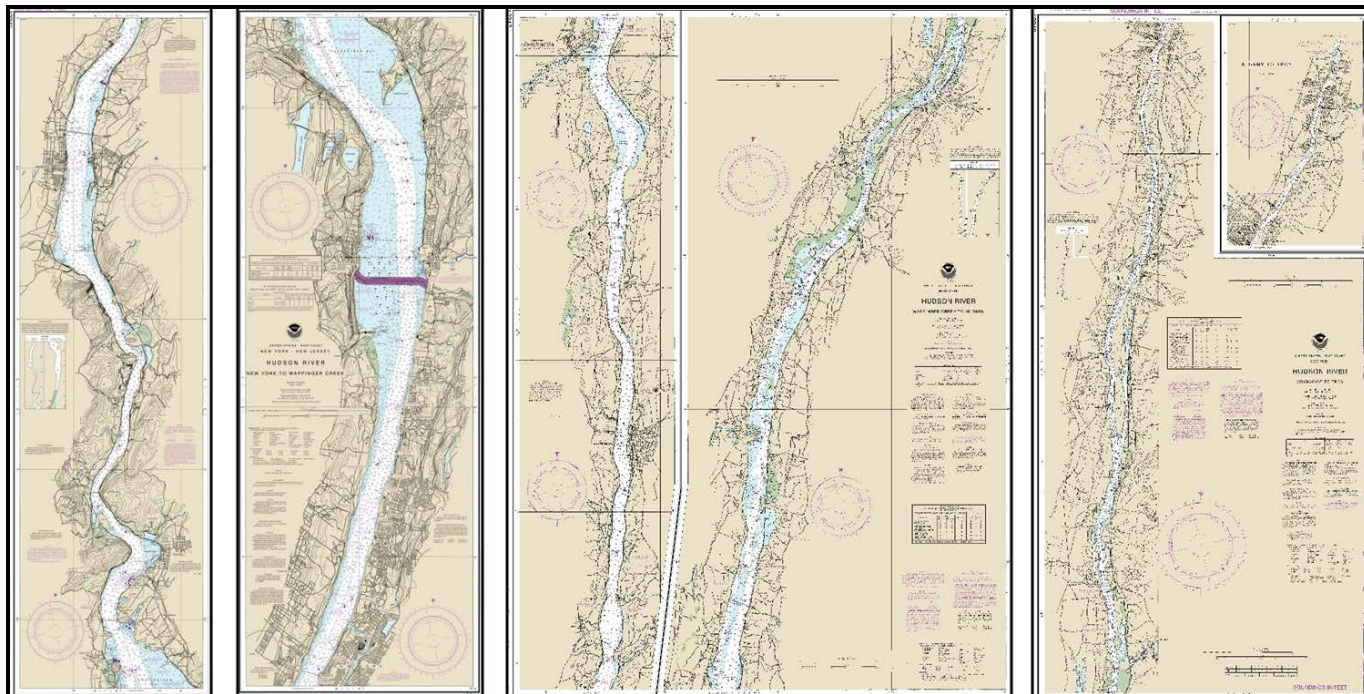
During the PAWSA workshops we acknowledged that the existing anchorage regulations are unclear, and we are considering how those regulations could be made more readily understood. We have no outcome timelines at this time. Any other substantive rulemaking effort associated with the Hudson River will follow Coast Guard public notice and comment rulemaking procedures to allow for public participation in the process.

The United States Coast Guard, Marine Transportation System Management Directorate, extends a sincere appreciation to the workshop participants for their contributions to the Hudson River PAWSA workshops. Their expertise was critical to the success of the workshop, and their recommendations will greatly assist the Coast Guard as it continues to work with Hudson stakeholders and the State of New York to further improve safety and efficiency for the Hudson River.

Section 1: Hudson River PAWSA - Assessment Area

The assessment area for both workshop included all waters of the Hudson River north of the Tappan Zee Bridge to Albany, New York.

Nautical charts referenced and displayed were 12343, 12347 and 12348.



Section 2: Baseline Risk Levels

The first step in the Hudson River PAWSA workshop was to complete PAWSA book 1 to determine a baseline risk level value for each risk factor in the Waterway Risk Model. To establish the baseline risks level, participants discussed as a large group each of 24 applicable risk factors in the Waterways Risk Mode, then each of the 15 teams of 2-3 selected a qualitative description for each risk factor that best described the conditions in the assessment area. These qualitative descriptions were converted to discrete values using numerical scales that were developed during earlier PAWSA workshops.

On those scales, 1.0 represents low risk (best case) and 9.0 represents high risk (worst case), with 5.0 being the mid-risk value. Risk values highlighted in red (values at or above 7.7) denote very high baseline risk levels; risk values highlighted in green (values at or below 2.3) denote very low baseline risk levels. Figure 3 below shows that the baseline risk level values for both workshops.

Baseline Risk Levels					
Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
Deep Draft Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personnel Injuries	Health and Safety
2.8	3.2	1.8	7.9	7.4	8.1
Shallow Draft Vessel Quality	Volume of Small Craft Traffic	Water Movement	Dimensions	Petroleum Discharge	Environmental
2.7	5.4	3.7	6.7	6.3	8.2
Commercial Fishing Vessel Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
3.0	6.4	4.3	5.5	5.8	7.1
Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic
8.4	5.5	7.1	6.4	8.0	6.8

Poughkeepsie

Baseline Risk Levels					
Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
Deep Draft Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personnel Injuries	Health and Safety
2.33	4.8	2.5	8.4	7.6	9.0
Shallow Draft Vessel Quality	Volume of Small Craft Traffic	Water Movement	Dimensions	Petroleum Discharge	Environmental
2.7	5.3	5.2	7.4	9.0	7.9
Commercial Fishing Vessel Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
5.6	5.5	5.0	6.0	9.0	5.6
Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic
8.0	5.3	5.4	9.0	9.0	7.8

Albany

Section 3: Team Expertise Cross-assessment

The second step in the Hudson River PAWSA workshops was completing a team expertise cross-assessment for all 15 teams. While every PAWSA workshop participant brought significant expertise and perspective strengths, the team expertise cross-assessment was used to weigh the relative strengths of each team with respect to the six overall risk categories. The results of the cross-assessments were then used to weight the inputs that each team provided in the other workbooks completed during the workshop.

After being presented with the concepts underlying the model, each participant team was asked to discuss how their background and experience aligned with the model. They then presented their self-assessment to the other teams to help all teams understand one another's varying degrees of expertise strength. After all teams spoke, each of the other 14 teams then evaluated whether the presenting team was in the top, middle, or lower third of all teams present with respect to knowledge and expertise in the six risk category areas.

Through this process, participants assessed their own and all the other participant teams' level of expertise for all six categories in the Waterway Risk Model. The table below breaks down the participants' expertise assessments for each risk category.

Team Expertise -- Distribution

Risk Category	Top 1/3	Mid 1/3	Lower 1/3
Vessel Conditions	39%	36%	26%
Traffic Conditions	56%	19%	25%
Navigational Conditions	56%	32%	12%
Waterway Conditions	31%	54%	15%
Immediate Consequences	42%	48%	10%
Subsequent Consequences	47%	40%	13%
All Categories Average	45%	38%	17%

Poughkeepsie

Team Expertise -- Distribution

Risk Category	Top 1/3	Mid 1/3	Lower 1/3
Vessel Conditions	39%	32%	30%
Traffic Conditions	44%	40%	16%
Navigational Conditions	45%	38%	17%
Waterway Conditions	34%	56%	10%
Immediate Consequences	54%	32%	14%
Subsequent Consequences	42%	26%	32%
All Categories Average	43%	37%	20%

Albany

Section 4: Existing Risk Mitigations

The third step in the Hudson River PAWSA workshop had participants evaluate the effectiveness of existing mitigation strategies in reducing the risk level for each risk factor. Participants discussed existing risk mitigations for all risk factors in the model, and then evaluated how effectively they thought the mitigations reduced risk. Some key points include:

- Risk factors shown in green there was consensus that risks were well balanced by existing mitigations.
- Risk factors shown in red there was consensus that risks were not balanced by existing mitigations.
- Risk factors shown in yellow there was no consensus that risks were balanced by existing mitigations.
- Consensus is defined as 2/3 of the workshop participant teams in agreement.

Mitigation Effectiveness											
Vessel Conditions		Traffic Conditions		Navigational Conditions		Waterway Conditions		Immediate Consequences		Subsequent Consequences	
Deep Draft Vessel Quality		Volume of Commercial Traffic		Winds		Visibility Impediments		Personnel Injuries		Health and Safety	
2.8	2.5	3.2	3.3	1.8	1.7	7.9	6.5	7.4	6.3	8.1	7.2
Balanced		Rising		Balanced		Balanced		Balanced		Maybe	
Shallow Draft Vessel Quality		Volume of Small Craft Traffic		Water Movement		Dimensions		Petroleum Discharge		Environmental	
2.7	2.5	5.4	5.5	3.7	4.2	6.7	6.3	6.3	6.6	8.2	7.9
Balanced		Balanced		NO		Balanced		Rising		Maybe	
Commercial Fishing Vessel Quality		Traffic Mix		Visibility Restrictions		Bottom Type		Hazardous Materials Release		Aquatic Resources	
3.0	2.5	6.4	7.1	4.3	5.4	5.5	5.2	5.8	5.8	7.1	6.9
Balanced		NO		Rising		Balanced		Maybe		Maybe	
Small Craft Quality		Congestion		Obstructions		Configuration		Mobility		Economic	
8.4	8.5	5.5	5.7	7.10	7.12	6.4	6.2	8.0	7.4	6.8	7.5
NO		NO		Rising		Balanced		Balanced		Rising	

Poughkeepsie

Mitigation Effectiveness											
Vessel Conditions		Traffic Conditions		Navigational Conditions		Waterway Conditions		Immediate Consequences		Subsequent Consequences	
Deep Draft Vessel Quality		Volume of Commercial Traffic		Winds		Visibility Impediments		Personnel Injuries		Health and Safety	
2.3	1.9	4.8	4.6	2.5	2.4	8.4	6.6	7.6	6.5	9.0	7.9
Balanced		Balanced		Balanced		Balanced		Balanced		Balanced	
Shallow Draft Vessel Quality		Volume of Small Craft Traffic		Water Movement		Dimensions		Petroleum Discharge		Environmental	
2.7	2.2	5.3	5.2	5.2	5.3	7.4	6.6	9.0	8.0	7.9	7.6
Balanced		Maybe		Balanced		Balanced		Maybe		Maybe	
Commercial Fishing Vessel Quality		Traffic Mix		Visibility Restrictions		Bottom Type		Hazardous Materials Release		Aquatic Resources	
5.6	4.3	5.5	5.5	5.0	5.0	6.0	5.1	9.0	7.8	5.6	6.2
Balanced		Balanced		Maybe		Balanced		Maybe		Rising	
Small Craft Quality		Congestion		Obstructions		Configuration		Mobility		Economic	
8.0	7.9	5.3	5.3	5.4	5.4	9.0	7.2	9.0	7.3	7.8	7.6
NO		Balanced		Balanced		Balanced		Balanced		Maybe	

Albany

Risk Factor	
Book 1 Score	Book 2 Score
Consensus Reached?	

EXPLANATION	
Book 1 Score	Level of risk - not taking into account existing mitigations
Book 3 Score	Level of risk - taking into account existing mitigations
Balanced	Consensus that risks are well balanced by existing mitigations
Maybe	No consensus that risks are well balanced by existing mitigations
Rising / NO	Consensus that existing mitigations DO NOT adequately balance risk

Section 5: Additional Risk Intervention Strategies

The last step in the workshop process was to complete book 4 by exploring potential additional mitigation strategies. Participants suggested additional risk interventions to further reduce risk, and then evaluated how successfully a proposed strategy could be at lowering risk levels.

For the Poughkeepsie workshop, additional mitigation strategies were discussed for those risk factors where there was consensus that risks were not adequately balanced by existing mitigations (Rising/No from the previous page), with the exception of the Volume of Commercial Traffic risk factor. Due to workshop time limitations and the relatively low mitigated risk level of 3.3, book 4 was not completed for this risk factor.

For the Albany workshop, like the Poughkeepsie workshop, additional mitigation strategies were discussed for those risk factors where there was consensus that risks were not adequately balanced by existing mitigations (Rising/No from the previous page). In addition, time remained to also complete book 4 for the Volume of Small Craft Traffic and the Visibility Restrictions risk factors.

The table below shows the new level of risk if taking the actions recommended by the participants.

Additional Interventions					
Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
Deep Draft Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personnel Injuries	Health and Safety
Balanced	(Book 4 not completed)	Balanced	Balanced	Balanced	(Book 4 not completed)
Shallow Draft Vessel Quality	Volume of Small Craft Traffic	Water Movement	Dimensions	Petroleum Discharge	Environmental
Balanced	Balanced	Nav / Hydro Info 4.0	Balanced	Coordination / Planning 6.5	(Book 4 not completed)
Commercial Fishing Vessel Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
Balanced	Coordination / Planning 6.7	Nav / Hydro Info 5.1	Balanced	(Book 4 not completed)	(Book 4 not completed)
Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic
Coordination / Planning 5.5	Coordination / Planning 5.1	Nav / Hydro Info 7.0	Balanced	Balanced	Coordination / Planning 7.1

Poughkeepsie

Additional Interventions					
Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
Deep Draft Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personnel Injuries	Health and Safety
Balanced	Balanced	Balanced	Balanced	Balanced	Balanced
Shallow Draft Vessel Quality	Volume of Small Craft Traffic	Water Movement	Dimensions	Petroleum Discharge	Environmental
Balanced	Rules & Procedures 5.1	Balanced	Balanced	(Book 4 not completed)	(Book 4 not completed)
Commercial Fishing Vessel Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
Balanced	Balanced	Radio Communications 4.3	Balanced	(Book 4 not completed)	Other Actions 6.0
Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic
Voluntary Training 6.3	Balanced	Balanced	Balanced	Balanced	(Book 4 not completed)

Albany

Risk Factor	
Intervention Category	
Risk Improvement	

EXPLANATION	
Intervention Category	Intervention category that most participants selected to further reduce risks
Risk Improvement	The expected level of risk that would be obtained if new mitigations measures were implemented
CAUTION - NO CENSUS ALERT	When Caution is displayed, an intervention strategy other than the one displayed was judged to provide more risk reduction than the one displayed. This is an indicator that the teams were divided in their opinions about what actions should be taken to further reduce risks for that factor. It indicates there is possibility more than "one" best mitigation measure to achieve further risk reduction.

Appendix A

Poughkeepsie Workshop – Participants

Randy Alstadt	Water Plant Administrator, Poughkeepsie
Frank Bergman	Hudson River Boat and Yacht Club Association, Inc.
John Bowie	The Vane Brothers Company
Joshua Buck	U.S. Coast Guard, Sector NY
Karen Caldwell	Pace University
Paul Chevalier	Hudson River Pilots
Tracey Corbitt	Westchester County Planning
Frank Csulak	NOAA, Office of Response and Restoration
Charles Cushing	Hudson River Waterfront Alliance
Roger Downs	Sierra Club Atlantic Chapter
Jerry Faiella	Historic Hudson River Towns
Ray Fusco	Paddle Sports
Chris Gardella	Tilcon Stone Quarry
Robert Haan	Dutchess County Medical Reserve Corps
Joe Hayes	Recreational Boater
Randall Hintz	U.S. Army Corps of Engineers, New York District
Scott Ireland	Hudson River Pilots
Eric Johansson	Tug and Barge Committee of New York/New Jersey
Scott Keller	Hudson River Valley National Heritage Area
Gregg Kenney	New York State, Department of Environmental Conservation
Steve Kress	McAllister Towing
Daniel Lemons	Village of Hastings-on-Hudson
John Lipscomb	Riverkeeper, Inc.
Joseph Long	Mohawk-Hudson Council of Yacht Clubs
John Madsen	University of Delaware
Jay Moritz	U.S. Coast Guard, Sector NY
Ian Mulcahy	U.S. Coast Guard Cutter KATHERINE WALKER
Mark Pacicca	Miller Environmental Group
James Quinn	New York State, Department of Environmental Conservation
Jay H. Reichgott	Reichgott Engineering, LLC

Stephan Ryba	U.S. Army Corps of Engineers, New York District
George Samalot	Samalot Marine
Michael St. Jeanos	New York State, Department of Environmental Conservation Police Dept.
Richard Stefanski	New York State, Office of Parks, Recreation and Historic Preservation
Ned Sullivan	Scenic Hudson, Inc.
David Vejar	NOAA Office of Coast Survey
Adam Whaley	U.S. Coast Guard, Aids to Navigation Team Saugerties NY
Deborah Wick	National Response Corporation
Stephanie Wojtowicz	New York Secretary of State Office
Sam Zapadinsky	Hudson River Pilots

Poughkeepsie Workshop - Observers

Allison Biasotti	Senator Chuck Schumer Office
Carolyn Blackwood	Resident, Rhinecliff, NY
Hayley Carlock	Scenic Hudson, Inc.
Erin Doran	Riverkeeper, Inc.
Margaret Doyle	Student, Pace University
Kathy Fallon	Congressman Mike Faso (NY-19) Office
Audrey Friedrichsen	Scenic Hudson, Inc.
Ann Gallelli	Trustee in the Village of Croton-on-Hudson
Harold Leath	Congressman Sean Maloney (NY-18) Office
Ed Leblanc	U.S. Coast Guard, Sector South Eastern New England
Ryan LeRoy	Miller Environmental Group
Althea Mullarkey	Scenic Hudson, Inc.
Shawn Sappington	U.S. Coast Guard, Aids to Navigation Team Saugerties NY
Christina Thomas	Student, Pace University
Brian Vahey	The American Waterways Operators
Christopher Whitson	Assemblyman Frank Skartados (104th District) Office

Albany Workshop – Participants

Alan Bish	Reinauer Transportation Cos., LLC
Collin Bryant	Coeymans Marine Towing
John Burgman	Albany Yacht Club
Haley Carlock	Scenic Hudson, Inc.
Ian Corcoran	Hudson River Pilots
Scott Croft	BoatUS
John Cronin	Pace University
Jay Dahleiden	Kirby Offshore Marine
Stephen Doherty	Hudson River Pilots
Dagmar Etkin	Environmental Research Consulting
Mark Foley	Constitution Federal Pilots
Dewayne Fox	Delaware State University
Matt Franklin	New York State, Department of Environmental Conservation Police Dept.
Robert Friedman	Natural Resources Defense Council
Charles Furman	Global Companies
Amy Gitchell	U.S. Army Corps of Engineers
Rob Goldman	New York State Marine Highway Transportation Co., LLC
Manna Jo Greene	Hudson River Sloop Clearwater
Greg Hitchen	U.S. Coast Guard, Sector NY
Justin Kaczynski	U.S. Coast Guard Cutter WIRE
Scott Keller	Hudson River Valley Greenway
Ed Kelly	New York/New Jersey Maritime Association
John Lipscomb	Riverkeeper, Inc.
Wayne Lopez	Columbia County Sheriff
Matthew Maraglio	New York Department of State
Hugh McCrory	U.S. Waterways Transportation LLC
Sam Merrett	Hudson Cruises, Inc.
Nancy Nodop	Recreational Boater
Mark Pacicca	Miller Environmental Group
Margaret Phelan	Resident, Port Ewen, New York
James Quinn	New York State, Department of Environmental Conservation

Eric Rivera	U.S. Coast Guard
Allen Rowe	Ulster County Sheriff
Richard Slingerland	Hudson River Waterfront Alliance
Richard Stefanski	New York State, Office of Parks, Recreation and Historic Preservation
Joseph Steyer	Ulster County Sheriff
Nicolette Vaughan	U.S. Coast Guard
Charles Wesley	New York State, Energy Research and Development Authority
Nick Zachos	Resident, Hudson, New York

Albany Workshop – Observers

Jen Benson	Riverkeeper, Inc.
Tim Berguson	Senator Sue Serino (NY-41) Office
Joshua Buck	U.S. Coast Guard
Erin Doran	Riverkeeper, Inc.
Andrew Feron	Hudson River Sloop Clearwater
Amanda Fallon	Senator Terence Murphy (NY-40) Office
Richard Hendrick	Albany Port District Commission
Daniel Hubbard	U.S. Coast Guard
Larry Justice	Hudson River Maritime, Inc.
Bernie Kelly	Global Companies
Ryan McAllister	Congressman John Faso (NY-19) Office
Althea Mullarkey	Scenic Hudson, Inc.
Jeff Parker	Kirby Offshore Marine
Johnathan Schafler	U.S. Coast Guard
Shereen Sheikh	New York State, Office of Parks, Recreation and Historic Preservation
Christopher Whitson	Assemblyman Frank Skartados (NY-104) Office
Bethany Wieczorek	New York State General Services
Kristin Williams	Assemblywoman Didi Barrett (NY-106) Office
Jeff Wright	New York State Bridge Authority
Brian Vahey	The American Waterways Operators

Appendix B

Poughkeepsie Workshop - Participant Comments on Trends in the Port and Existing Risk Mitigations

The participants are the local subject matter experts, and these comments capture their opinions, providing a general sense of the ideas discussed during the workshop. These comments provide various perspectives representing widely different interests.

Deep Draft Vessel Quality:

Trends/Observations:

- Deep draft vessels are generally in great condition, and the pilots, masters and crews are extremely proficient.
- The majority of deep draft vessels coming up the river are well maintained. Crew proficiency can vary from ship to ship, but it is generally “upper shelf”.
- Vessel quality has improved, but there is still the risk of an incident due to mechanical failures and human error.
- The majority of deep draft vessels are foreign flagged, but they generally don’t increase waterway risk. They have been boarded and piloted by a state-registered Sandy Hook Pilot prior to entering the Hudson River.
- There are good communications between the Sandy Hook pilots and the Hudson River Pilots. If a safety or material condition issue is identified on a vessel, that information is relayed to the Hudson River pilots.
- Foreign-flagged vessels transit the river as far as Albany. Mixed crew nationalities can increase risk. Most of the deep draft vessels are bulk cargo vessels carrying cargo such as salt or iron. These vessels are typically of lower quality when compared to tankers.
- There is a low probability of an incompetent crew or poor quality vessel transiting the Hudson River due to pre-arrival screening, Coast Guard Port State Control (PSC) inspections and internal company vetting programs and procedures.
- Deep draft vessels are responsive on the radio. Pilots are good at communicating with other vessels and letting them know their intentions.

Existing Mitigations:

- All deep draft vessels are vetted and evaluated by the Coast Guard for safety concerns.
- US Coast Guard Port State Control inspections evaluate the condition of the ship, the company’s operating history, the classification society, and prior inspection history.
- New York has some of the highest quality pilot training in the country. Pilots have the power to “veto” a transit due to vessel or weather conditions.
- Vessel boardings occur near the Indian Point nuclear power plant and before entering New York Harbor. Problem vessels are identified before entering the confined waters of the Hudson River.
- International Maritime Organization (IMO) International Safety Management Code provides international standards for the safe management and operation of ships and for pollution prevention.

- Ship Inspection Report Program (SIRE) system. SIRE is a tank vessel risk assessment tool that is used by industry to track and document a tank vessel's compliance with safety and inspection requirements.
- The International Convention of Standards of Training, Certification and Watchkeeping (STCW) sets qualification standards for masters, officers and watch personnel on seagoing merchant ships.
- The U.S. Coast Guard issues certificates of inspection and marine credentialing.

Shallow Draft Vessel Quality:

Trends/Observations:

- Tug and barges can be big (approaching deep draft size). They are more cost efficient to operate due to manning requirements.
- Passenger vessels transit the river seasonally. There is a daily commuter ferry between Haverstraw and Ossining. The quality of these passenger vessels is good.
- Tug and barges represent most commercial traffic on the river. All are U.S. manned and built. They are double hulled and twin-screwed. Overall quality is excellent as supported by various inspection and audit programs.
- Barges at anchor usually have bright deck lights illuminated for safety reason. Some residents feel the barges may be displaying too many lights.

Existing Mitigations:

- Stringent safety standards and inspections requirements for tugs, barges and passenger vessels.
- SIRE (Ship Inspection and Reporting) inspections are conducted every 6 months.
- The Oil Company International Marine Forum (OCIMF) Tanker Management Self-Assessment (TMSA) program is used by oil companies to improve their safety management systems.
- USCG Sub-chapter M inspection requirements for towing vessels. Many companies have already begun implementing new safety and environmental standards for towing vessels. (46 CFR Chapter I, Subchapter M – Towing Vessels supersedes the jurisdiction of the Occupational Safety and Health Administration (OHS) and any state regulations on vessel design, construction, alteration, repair, maintenance, operation, equipping, personnel qualifications and manning. Subchapter M will be phased in over a six-year period for existing vessels. Although the law took effect in July 2016, existing vessels will not be required to meet most of its requirements until July 20, 2018.)
- The Towing Management Safety System (TMSS) has greatly improved operational safety.
- Crews go through extensive training: firefighting, bridge resource management, radar, and navigation training.
- Crews on spill response vessels are trained semi-annually and annually.
- Passenger vessels are inspected annually by the USCG. Inspections include a review of watch standing, crew training, and emergency procedures.
- Anchored vessels are manned at all times in the river.
- Mariners are subject to drug-testing and undergo physical examinations.
- The mindset of mariners and shipping companies has shifted from strictly profit driven to safety driven.
- Double hulled tank barges protect the oil cargo and reduce the probability of a hull breach and oil spill.

Commercial Fishing Vessel Quality:

Trends/Observations:

- Commercial fishing is limited to a small herring fishery on the Hudson. Vessel quality is similar to small craft. Commercial fishing may grow as the river becomes cleaner, but there are no large-scale commercial fishing vessel operations on the Hudson River.

Small Craft Quality:

Trends/Observations:

- There is heavy recreational traffic on the Hudson River, but it is seasonal (April to October).
- Vessel quality varies widely; it's the largest variable and risk. There are lot of small plastic craft that may not be in great repair. Fiberglass paddle craft can be better quality. Sea-going kayaks with cockpit covers are adequate for the Hudson River.
- The power driven recreational vessels are usually older.
- Power boating has diminished or leveled off in recent years, but paddle craft use has exploded. This is especially true between the Tappan Zee Bridge and the Bear Mountain Bridge. Paddle craft users are usually unaware of the best safety practices, and they are not required to take a boating safety course.
- There are boating safety programs available and sometimes required for recreational operators. Until a couple years ago, required boating safety courses included 6 hours of classroom training. A 4-hour, online class is now an alternative to the classroom requirement, which may be less effective than the classroom training.
- Vessels are getting faster (70-80+ mph), and there are various waterfront bars on the river.
- Some recreational boats only have one person onboard. This can increase risk in the case of a vessel casualty.
- Small boaters are generally not experienced with the river's tides and currents.
- Navigation proficiency, including the use of onboard navigation equipment, is not as great in the recreational community. They may not understand the danger to themselves or others.
- Local recreational boating guides are careful and knowledgeable.
- Approximately 38% of recreational boating fatalities are associated with paddle craft. In the last couple years, paddle craft deaths have increased despite the number of total fatalities decreasing.
- In general, the quality of recreational vessels and education of users has increased over the past 20-30 years.

Existing Mitigations:

- All personal watercraft operators must take a boating safety course.
- All recreational boaters born after May 1996 must take a boating safety course.
- All vessel operating in NYS must have a Personal Flotation Device (PFD) onboard and in addition boaters on vessels under 21 ft must wear a PFD from Nov 1-May 1.
- All river communities, except for one, have a marine patrol. The state has marine patrols as well.
- The USCG promotes a robust recreational boating safety program. This is supported by the USCG Auxiliary courses, courtesy dockside examinations, outreach and training.

- There are seated field sobriety tests that can be completed on a rocking/moving vessel. This has increased law enforcement's ability to enforce Boating While Intoxicated (BWI) laws.
- New York State has the Tiffany Heitkamp Law: driving and boating infractions can be considered together by the courts.
- The popular paddle craft launch points have experienced guide services and outfitters nearby. Outfitters coordinate with the state to promote boating safety.
- More paddle craft users are seeking education. Boating safety classes and inspections are popular.
- Bright stickers are put on paddles to increase the visibility of paddle craft.
- Commercial operators use sound signals to warn recreational boaters.
- New York State enforces the Inland Rules of the Road, and sound producing devices are required.
- The state provides boating safety training for law enforcement officials.
- There is a web platform for safe boating in the area: www.thesafeharbor.us

Volume of Commercial Traffic:

Trends/Observations:

- USACE Waterborne Commerce data suggests there was a 19% reduction in transits and 9.9% decrease in tonnage over the past 6 years. This data may not be accurate because it's based on industry reporting. In some cases, these estimates are lower than actual transits/tonnage.
- Reasonable annual cargo estimates: 1.5 billion gallons of gasoline, 1.3 billion gallons of home heating oil, and 6.5 million tons of dry bulk.
- Number of cargo handling facilities and permits has increased in recent years.
- Cargo volume is a function of consumer demand and regional projects. For example, a windmill project temporarily increased shipments of windmill parts.
- Commercial traffic volume is relatively high when compared to other similar waterways. However, it is not high when compared to the nation's biggest ports such as New York or Houston.
- Over a period of 20 years, traffic has remained relatively stable except for petroleum shipments. Petroleum shipments fluctuate greatly with consumer demand.
- The Hudson River is designated as a Marine Highway by the Maritime Administration (MARAD).
- The US Army Corps of Engineers (USACE) classifies the river as a "high use" waterway (carrying over a million tons of cargo per year).
- There is usually a minimum of 8 commercial ship movements per day on the Hudson River.

Existing Mitigations:

- Vessels must have detailed voyage plans.
- Shipping companies and vessels communicate and coordinate.
- Automatic Identification System (AIS) carriage requirements.
- Security calls are used frequently and alert mariners to known or possible dangers.
- Convoys are formed for ice breaker escorts.

- Existing anchorages promote the safe management of traffic volume. These traditional anchorages have been used for over 100 years. A Coast Pilot in 1966 states vessels anchor off Kingston to await transit to Albany. The ability and authority for masters to stop due to inclement weather conditions is critical.
- A vessel in distress can anchor at any time and in any location. However, this does not mitigate risks associated with routine traffic management practices.

Volume of Small Craft Traffic:

Trends/Observations:

- Recreational vessel traffic is seasonal and weekend based.
- Striper season (recreational fishing) can significantly increase traffic from April to June.
- Marine events, such as 4th of July, can drastically increase traffic.
- The number of small boat rental facilities is increasing. There are currently about a dozen.
- The volume of small craft motorized vessels is relatively constant, but paddle craft volume is on the rise.
- Gas prices can influence small craft traffic volumes. Higher gas prices equates to lower numbers of small craft out on the water.

Existing Mitigations:

- The state has a local waterfront use program that includes harbor management plans for recreational boating. These can have restrictions for small craft traffic management. Only one community in the study area has one of these harbor management plans.

Traffic Mix:

Trends/Observations:

- There's significant risk associated with the mix of paddle craft and larger commercial vessels. Commercial operators usually experience conflicts with paddle craft on almost every trip.
- Small vessels sometimes anchor in the channel, which poses problems to deep draft vessel transits.
- The entire river is a mixed use waterway except during the winter. From November to April, the waterway is single (commercial) use.
- Sea planes have had near misses with kayaks or paddle craft.

Existing Mitigations:

- Experienced kayakers transit across the river in a wide line which presents a small target for commercial vessels.
- Harbor management plans include policies for managing the traffic mix.
- Good radio communication between sailboat regatta managers and commercial traffic.
- Many yacht clubs and marinas on the river regularly communicate and discuss safety issues.

Congestion:

Trends/Observations:

- Roundout Creek, Catskill Creek, and Espouse Creek are areas that can be particularly congested with recreational boaters on the weekends.
- There is an amphitheater on the water in Albany, north of the port facilities, which sometimes attracts large numbers of small craft.

Existing Mitigations:

- Great communication between pilots and shipping companies.
- The anchorage bullets from the “Volume of Commercial Traffic” also mitigate congestion issues.

Winds:

Trends/Observations:

- From a commercial perspective, the winds are typically moderate and from the west. Besides extreme weather events, winds do not affect normal operations.
- Hurricanes and other extreme events can cause vessels from the lower river to seek shelter in the upper river.
- All waterway users have adequate and accurate weather forecasting tools.

Existing Mitigations:

- Weather forecasts are readily available, accurate, and adequate. These forecasts are used by both commercial and recreational boaters.

Water Movement:

Trends/Observations:

- Tides and currents can make the river dangerous in almost all areas.
- Winds and tides can be a dangerous combination.
- Water movement can create risky interactions between commercial vessel and small recreational traffic.
- The current and water elevation can fluctuate greatly depending on the weather. This impacts voyage planning for commercial traffic.
- Tidal currents usually max out at 2 kts.

Existing Mitigations:

- Water movement is incorporated in voyage planning.
- Tide and current predictions are readily available and accurate.
- There is a certified tide station at Turkey Point. It is part of a sea level and climate change study.

- The NOAA Hydrographic Division completed a new bottom survey in 2016, and the data is under review. It should be added to charts relatively soon.

Visibility Restrictions:

Trends/Observations:

- Fog is seasonal.
- Kingston to Hudson and Castleton to Albany usually have fog from midnight to 0900.
- Most common fog is radiation fog in the fall. This generally burns off in the morning after sunrise.
- North and South winds can produce fog.
- Snow and heavy rain can restrict visibility.

Existing Mitigations:

- There is a live camera on Saugerties Lighthouse (www.saugertieslighthouse.com) that can be used to assess visibility. In the future, existing bridge cameras could be used in the same way.
- Electronic aids to navigation (ATON) supplement physical ATON.

Obstructions:

Trends/Observations:

- Ice can form from January to March, and it fluctuates from year to year. The effect on navigation can be huge. Ice can influence the following: visibility, aids to navigation discrepancies, and transit times (4x longer transit). Silver Point, Worlds End, and Kingston can be choke points. Plate ice can be up to 1.5 ft thick, and refrozen brash can be up to 6 ft thick. Brash builds up in choke points. Drifting ice can cause vessels to drag anchor.
- Lots of debris enters the river following: precipitation events greater than 1 inch, high tide with calm winds, and lock openings in the Spring. This debris can include up to full size trees.
- Construction projects and submerged cables can be obstructions. Some submerged cables are abandoned and on top of the sediment. Cables running parallel to the channel can be hazardous because of questions regarding the exact location.
- Marinas located close to the channel can be obstructions.
- There are few fixed fishing structures. The shad fishery is closed, but there are some nets used for herring.

Existing Mitigations:

- Vessels communicate with each other.
- Convoys are formed for ice breaking escorts.
- The USCG has a regulated navigation area that has horsepower restrictions based on ice thickness.
- The USCG tracks vessel transits during ice conditions.

Visibility Impediments:

Trends/Observations:

- Bridges can obstruct visibility, especially for small vessels.
- AIS coverage is intermittent from Tarrytown to Albany.
- For a small vessel's height of eye, background lighting from large communities can obstruct lighted aids to navigation. The risk is greatest in areas south of Stony Point.
- Railroad lights can be confused for vessel lights when transiting south through Worlds End. Some vessels have run aground because of this.

Existing Mitigations:

- AIS, radar, and bridge to bridge communications reduce risks associated with visibility impediments.

Dimensions:

Trends/Observations:

- There are air draft concerns with the Mid-Hudson and Castleton bridges for deep draft vessels.
- Ice tracks can be restricted to 100 ft wide.
- Perceived channel width can be less than actual channel width, especially in the southern portions of the river.

Existing Mitigations:

- The river was surveyed in 2016.
- Portions of the river can be shut down for shipping large equipment.
- Good communication and planning between the shipping industry and the USCG.

Bottom Type:

Trends/Observations:

- The river channel bottom is usually soft. There is more sand and gravel north of Catskill.
- There are rocky outcroppings near the channel edges in areas just north and south of Kingston.

Existing Mitigations:

- The NOAA nautical charts are updated weekly, and chart discrepancies can easily be reported. NOAA quickly responds to chart discrepancies.

Configuration:

Trends/Observations:

- There are several turns and bends greater than 45 degrees. Some of them include Four Mile Point, Bear Mountain Bridge, Worlds End, Kingston, Silver Point, Catskill, and Hudson.
- From Kingston to Albany (45 miles), it is long and narrow. There are few points to bail out; it's the point of no return. Hyde Park Anchorage doesn't always serve as an adequate point of no return because fog conditions can quickly change north of the anchorage.
- Due to the length of the river, waterway and environmental conditions can significantly change during a transit. Transit time can fluctuate between 12 hours and 36 hours.
- There are two vessels that take 300 to 500 passengers from NYC to the Bear Mountain Bridge or Cold Spring. Recreational vessels will also make this transit over the course of several days. These transits are seasonal, usually during "leaf peeper" season.
- The length of the river is a risk. Shipping orders or assignments can change while enroute to a facility.

Existing Mitigations:

- In general, the aids to navigation are adequate.
- The quality of nautical publications has improved.
- There are no fleeting operations in the anchorages in question.

Personnel Injuries:

Trends/Observations:

- "Leaf peeper" cruises: Sea Streak has about 500 people and Circle Line has about 340 people. American Cruise Line vessels have 200 to 300 passengers, and there are usually 2-3 on the river at a time.
- The Rip Van Winkle (Kingston), Dutch Apple (Albany), and Captain JP (Troy) have around 300 to 400 passengers.
- Even the death of 12 people would be catastrophic. The probability is low, but the impact is high.

Existing Mitigations:

- Commercial vessels and their crews conduct extensive trainings and drills.
- There is a multi-agency committee that meets twice a year to discuss past incidents and training opportunities. There is also a regional committee.
- Education reduces the risk of personnel injuries.
- There is a robust local response capability to respond to and treat personnel injuries.

Petroleum Discharge:

Trends/Observations:

- Primary petroleum shipments: Ethanol (2-3 trips per year), asphalt (demand driven by construction projects), gasoline, and home heating oil.
- The average barge varies, about 50,000 barrels, and the maximum is about 155,000 barrels.
- Tankers are typically carry about 80,000-220,000 barrels.
- Bakken crude shipments headed south from Albany have decreased due to crude oil prices. Some argue the decrease in shipments is due to increased rail capacity.
- LNG is taking over heavy fuel oil. This may result in a decrease in petroleum shipments, but recent trends have been increasing.
- There limited locations to deploy large response equipment.
- No two spills are the same, and all responses are different. The general rule of thumb is 10-20% recovery.
- Local first responders are not capable of handling a medium or major spill.

Existing Mitigations:

- Response plans are well established and routinely practiced with drills. However, they will not alleviate all risk; there will be an impact if there is a major spill.
- The state has pre-staged spill response equipment and regularly conducts exercises.
- Contracted Oil Spill Response Organizations (OSRO) have equipment staged throughout the entire river. The OSRO is inspected by their clients and the Environmental Protection Agency.
- There are several OSROs in the state, and they all work well together.
- The USCG has spill response assets and equipment.
- There are substantial federal requirements for response plans and equipment.
- There has been a significant improvement in overall spill response capability over the past 20 years.
- The design of the vessels/barges and facilities minimizes the risk of spills.
- There are efforts underway to develop better spill modeling on the Hudson River.

Hazardous Materials Release:

Trends/Observations:

- Some PCB-contaminated sediments and materials are shipped by barge on the river.
- Urea and calcium chloride are shipped on the river.

Existing Mitigations:

- The mitigations listed in the “Petroleum Discharge” section are also applicable to the “Hazardous Materials Release” risk factor.

Mobility:

Trends/Observations:

- North of Kingston any grounding or incident would likely close the river. South of Kingston a closure would depend on the severity of the incident.
- Ice can severely restrict mobility. One vessel becoming beset in ice can stop traffic.
- Rail or facility accidents could close the river or affect marine mobility.
- West Point and Indian Point are particularly sensitive to closures.
- An incident in the Hudson Highlands could easily result in a waterway closure.

Existing Mitigations:

- There is good communication amongst the pilots.
- The Captain of the Port has broad authority to manage risks that could impact mobility. This includes establishing safety zones.
- Commerce could be shipped by road or rail, but this does not necessarily reduce risk. The road and rail infrastructure is extensive.
- There is good communication to notify mariners of port closures or interruptions. There is a formal written policy to notify traffic in the immediate area and appropriate authorities.
- State marine law enforcement training includes safety zone implementation and enforcement.
- There are multi-agency exercises that improve communication between agencies.

Health and Safety:

Trends/Observations:

- The river is the only drinking water source in the area. A serious spill could render hundreds of thousands of people without water.
- Perceived health and safety issues can be just as bad as an actual issue. This is particularly important for economic effects.
- Some port and waterfront facilities are located near populated areas. Even tug idling affects air quality.
- Most communities along the river are under 25,000 people. Cities such as Albany, Poughkeepsie, and Newburgh have greater populations.
- Bridge damage could affect marine and roadway safety.
- Tidal variations can impact north/south movement of a floating hazard. It can take 20+ days for an object to float from Albany to New York City due to the tide.

Existing Mitigations:

- Medical and transportation infrastructure is great and well developed.
- There is a medical reserve corps that educates the public in disaster preparedness.

- New York State recently transitioned from an agency organized response to an emergency management organized response. Emergency response is one of the Governor's top priorities.
- There is an area emergency response plan that involves the local communities.

Environmental:

Trends/Observations:

- Atlantic sturgeon, shortnose sturgeon, and their critical habitat are federally protected by NOAA. Their critical habitat is throughout the entire river. The Fish and Wildlife Service has other federally protected species.
- Most of the river is environmentally sensitive; it's more than 50% but probably less than 90%.
- Hyde Park is a critical area for Atlantic sturgeon from May to July.
- Port Ewen is an overwintering area for shortnose sturgeon.
- Marlboro is a spawning area for shortnose sturgeon.
- Shortnose sturgeon are found all the way up Troy, and Atlantic sturgeon are found up to Kingston.
- The NY Department of State has designated significant habitat areas. These areas include Kingston, the Hudson Highlands, and the Flats. There are about 35 of these areas, and they are in the deeper portions of the river.
- North of the salt line (around West Point) the freshwater estuary/wetlands are rare. These wetlands are sensitive.
- There are about 200-300 different species of fish in the river, but there also birds and mammals that could be affected.
- Haverstraw Bay is important habitat for bald eagles and common loons.
- The state has designated many areas as scenically significant.
- Anchors can damage benthic habitat.
- The river has already experienced many environmental setbacks (i.e., PCB contamination).

Existing Mitigations:

- There are shore cleanup and restoration efforts underway.
- Engineering practices for coastal restoration are mature.
- Environmental mitigation measures are covered by other categories such as "Vessel Quality".
- Hudson River Emergency Management Association has collected environmental data for 20 years.
- The Hudson River Estuary Plan provides funding for stabilization and restoration.
- There is a Hudson River Comprehensive Restoration Plan: www.thehudsonweshare.org
- Communities are outspoken and aware of environmental issues.
- Federal agencies complete a national restoration damage assessment to formulate restoration plans.
- The "Riverkeeper" model was started at the Hudson River, and there are expertise in the area.

Aquatic Resources:

Trends/Observations:

- The river is a spawning area for some fish species. Indirectly, the river contributes to aquatic resources throughout the Eastern Seaboard.

- Recreational fishing is important on the river.
- According to the state, Haverstraw Bay and other areas are important to recreational and commercial fisheries. These are the 35 significant habitat areas as mentioned in the “Environmental” category.
- There is a significant population that subsistence fishes.

Existing Mitigations:

- The mitigations listed in the “Environmental” section are also applicable to the “Aquatic Resources” risk factor.

Economic:

Trends/Observations:

- Many towns have dedicated money to revitalizing the riverfront habitat and parks.
- Tourism is important to the area, and it contributes \$5.2 billion/year to the regional economy. Recreational boating contributes \$184 million/year to the area’s economy.
- Maritime commerce is significant. Issues with home heating oil, gasoline, and heavy lift shipments would be costly. Disruptions to the heavy lift equipment could have indirect impacts to other areas of the country.
- Damage to bridges would greatly affect the everyday life of local citizens.
- The river’s connection to the Port of New York could result in a national impact.
- New York State ships 28 million tons of marine cargo per year. This value of shipped manufactured goods is \$96.4 billion per year. This contributes \$32 billion to the state’s economy.
- The economy of shoreline communities is shifting from industrial manufacturing to tourism. This could make the communities more vulnerable to pollution or changes in water quality.
- Shortage of heating oil could be detrimental. There would be direct and indirect impacts.

Existing Mitigations:

- There are robust road and rail networks in the area.
- If a 3rd party is impacted by a spill, they can file a claim with the responsible party. If the claims exceed the liability limit, claims can be filed under the Oil Spill Liability Trust Fund (OSLTF).
- Ice breakers facilitate the movement of commerce in the winter. The Hudson River is the USCG First District’s top ice breaking priority.
- There are methods to facilitate the movement of priority cargo (i.e., heating oil) in the case of an incident.

Appendix C

Albany Workshop - Participant Comments on Trends in the Port and Existing Risk Mitigations

The participants are the local subject matter experts, and these comments capture their opinions, providing a general sense of the ideas discussed during the workshop. These comments provide various perspectives representing widely different interests.

Deep Draft Vessel Quality:

Trends/Observations:

- Deep draft vessels are generally great quality. Quality has significantly increased over the past 15 years, and most vessels are new. All crews are licensed. The crew quality can vary, but all deep draft vessels have pilots aboard. Pilots have great communication with the USCG, VTS, and other waterway users. They pass issues and concerns to authorities. Pilots are also extraordinarily qualified and courteous.
- Bulk carrier quality is usually less than vessels transporting higher-value cargo.
- Deep draft vessel casualties are rare and occur mostly in the southern portion of the river.
- Ships are required to run on diesel in coastal areas, but some ships were not designed to maneuver with a diesel plant. This can impact maneuverability in narrow portions of the river.
- Some new technology actually increases risk. For instance, a modern propulsion plant may shut down entirely due to a faulty lube oil sensor.

Existing Mitigations:

- USCG Port State Control inspection program is used to vet vessels prior to arriving in US ports.
- Vessels submit a 96-hour notice of arrival, and high risk vessels are inspected.
- Vessels check in/out with the VTS as they enter and depart the river in New York Harbor.
- All mechanical issues are reported to the USCG before they enter the river.
- All deep draft vessels have state pilots on board. The pilots take annual physical exams and proficiency exams. The number of pilots is continually monitored to ensure there are enough to meet demand.
- Foreign flagged vessel captains are certified by their respective flag states. Foreign vessels must comply with Safety of Life at Sea (SOLAS) requirements. Most crews on foreign flagged vessels are proficient in English.
- Any vessel entering the United States must have a Certificate of Fiscal Responsibility. All vessels, including tankers and non-tankers, must also have a vessel response plan. The plan requires the

designation of an Oil Spill Response Organization (OSRO) and ensures they have the equipment to respond to an incident

- Some tankers are doubled hulled.
- Private cargo facilities also vet ships.
- Industry is driving a culture of safety.

Shallow Draft Vessel Quality:

Trends/Observations:

- Some hazardous cargo is transported in double hulled barges.
- Crews are vetted and U.S. licensed.
- Navigation season is limited due to ice, so there is a high operational tempo during the open season.
- Vessels are new with an average age of about 6 years old.
- Masters and engineers have certification and qualifications.
- Shipping companies have training sessions every year, which include simulators and bridge resource management topics.
- There may be safety issues associated with crew fatigue. However, companies do maintain crew management standards, and there are federal crew rest requirements. Companies employ a computer program called Watch Keeper 3 to assist in developing watch schedules.
- Some incidents may be attributed to a lack of local knowledge, but the USCG and shipping companies have recency requirements for captains and pilots to ensure they remain proficient for the route that they are navigating.
- There are ferries between Ossining and Haverstraw and Newburgh and Beacon. Ferry operators are proficient, and the vessels are well maintained.

Existing Mitigations:

- Shallow draft vessels (towing vessels) will soon be subject to sub-chapter M requirements. Many companies are voluntarily meeting sub-chapter M requirements before the implementation deadline.
- All tankers and tank barges subject themselves to additional inspections/requirements: International Convention on Standards of Training, Certification and Watchkeeping (STCW); Ship Inspection Report Program (SIRE); and internal inspections.
- Tank barges are double hulled.
- US crews are some of the best qualified crews in the world.
- Navigation technology is top notch, and it has improved safety.
- Tugs/barges don't have pilots, but the captains are certified and proficient to operate on the river.

- Some towing vessel companies expand the bridge crew to three people while operating on the river. They also complete a risk assessment before every evolution/transit. It's in the company's best interest to safely transport cargo.
- Vessel system redundancy is being implemented. For equipment, there is a backup to the backup. Furthermore, redundant systems are independent of each other.
- Most tugs and barges are new and many burn cleaner fuel than required. Their emissions are below the federal standards.
- Shallow and deep draft vessels must comply with ballast water and discharge regulations.

Commercial Fishing Vessel Quality:

Trends/Observations:

- There is a temporary prohibition on most commercial fishing. Shad and sturgeon are closed. Crab and herring are the only active fisheries.
- When more fisheries were open, vessels were 15-20 foot open skiffs constructed of fiberglass. Crews were experienced and usually consisted of 1 or 2 people.
- There are traditional fishing areas on the river. If the prohibition is lifted in the future, these areas could be impacted by the establishment of anchorages.

Existing Mitigations:

- Not applicable due to the lack of commercial fishing vessels.

Small Craft Quality:

Trends/Observations:

- There are recreational boats on the river from Memorial Day to Labor Day. The majority know what they're doing but some don't.
- Pilots have issues with recreational boaters on almost every trip. Examples include anchoring and water skiing in the channel.
- Jet skis and paddle craft are a huge risk on the river. Some people have a serious lack of knowledge, especially with complying with the rules of the road.
- Some recreational boaters aren't aware of river dangers such as rocks and currents. They generally lack the proficiency of commercial operators.
- Commercial operators will warn each other of the presence of kayak groups.
- A decrease in USCG Auxiliary presence on the river has increased recreational boating risk.

- A boating safety course isn't required for everyone, but some yacht clubs and marinas require insurance and their own training.
- Licensing is a great way to raise government funds, but it might not be a cure all for recreational boating safety. The most effective mitigation is education.

Existing Mitigations:

- Some local marinas have their own signs and rules regarding alcohol consumption on recreational vessels.
- Kayakers are encouraged to put reflective tape/stickers on their paddles.
- The state mitigates with education and enforcement. They provide grants and boating safety classes. They reimburse local authorities for marine patrols. A boating safety class is mandatory for PWC operators and motor boat operators born after May 1, 1996. The state is currently focusing outreach efforts on the paddle craft community.
- There are multiple opportunities for education: online, state parks classes, USCG Auxiliary, and U.S. Power Squadron.
- There are paddle craft outfitters and guides. These organizations promote boating safety.
- Over enforcement can be a concern. There are some instances of people being boarded several times in a single day. However, boaters can display proof of a boarding to avoid further boarding's. Local authorities focus on safety, not just enforcement. Stops result in education, not tickets.
- New York State provides grants for communities that would like to establish a harbor management program.
- Over 23,000 New York recreational boaters took a boating safety class in 2015.
- There is a website and video recently created for traffic mix: www.safeharbor.us

Volume of Commercial Traffic:

Trends/Observations:

- There are 600,000 transits per year in New York Harbor. Based on VTS checkout/in data, there are at least 3,000 transits per year on the Hudson River above the Holland Tunnel.
- In addition to what passes through New York Harbor, there are vessels such as rock boats that only transit above the VTS zone.
- USACE Waterborne Commerce Data from 2015: 1,441 commercial deep draft transits and 14,344 commercial shallow draft transits; 15,785 transits per year and approximately 43 per day.
- USACE Waterborne Commerce Data may not be accurate. Pilots have seen cargo that was not included in the data.

- Even with moderate traffic, there can be delays due to weather and berth congestion. Traffic volume doesn't necessarily correlate with the frequency and length of delays. Maximum delays are around 24 hours.
- There is traffic in Tarrytown for construction of the new Tappan Zee Bridge.

Existing Mitigations:

- All vessels must have detailed voyage plans.
- Great communication on the water and between shipping companies.

Volume of Small Craft Traffic:

Trends/Observations:

- Recreational vessel traffic is seasonal and weather dependent. Traffic is greatest during summer weekends with nice weather. The busiest days are July 4th, Labor Day, and Memorial Day. Hudson River boaters are fair weather boaters.
- The number of registered motor boats in New York State has leveled off at about 400,460. However, the number of paddle craft has exploded. There are now 12 paddle craft outfitters on the river.

Existing Mitigations:

- Increased outreach to promote responsible traffic management.
- A ferry and kayak collision in New York Harbor increased this topic's visibility and interest.
- There is a speed limit when vessels are within 100 ft of the shore, piers, anchored vessels, etc.
- Enforcement is increased during popular boating periods such as the 4th of July.
- The Coast Guard establishes safety zones and issue permits for marine events.
- There are areas where recreational boaters cannot transit. Examples of these areas include near Indian Point and the Tappan Zee Bridge. These safety and security zones shown on nautical charts and are published in the federal regulations and local notice to mariners.

Traffic Mix:

Trends/Observations:

- Lots of conflicts between recreational boaters and commercial traffic. Conflicts are seasonal because recreational traffic is seasonal.
- Traffic mix is really bad on the 4th of July and other periods of high recreational traffic.

Existing Mitigations:

- Commercial vessels have a look out and constantly monitor radio traffic.
- Some educational programs emphasize safe interactions between commercial and recreational vessels. The Hudson River Valley Greenway's program focuses on this.
- There is communication between commercial vessels. They warn each other of risky small craft.

Congestion:**Trends/Observations:**

- North of Kingston there can be congestion due to ice.
- All communities with boat clubs/ramps can be congested.

Existing Mitigations:

- Events that are a hazard to navigation must be permitted. This may include safety zones and notifications (LNM, BNM).
- USACE permits structures in the waterway, including those associated with marine events.
- Vessels use VHF radios, AIS, and radars to mitigate congestion.

Winds:**Trends/Observations:**

- Winds are generally out of the west or northwest. They usually come at the worst time, and northwest winds can be difficult for commercial vessels.
- Winds are well forecasted, and the forecasts are improving.
- Winds pose the greatest risk in areas that are narrow or congested (above 4-mile Point).
- Wind direction and speed varies by season.
- Climate change could be causing more extreme weather events.

Existing Mitigations:

- Mitigated by voyage planning and accurate forecasting.

Water Movement:**Trends/Observations:**

- Voyage planning is greatly influenced by tides and currents.
- Snow melt and rains increase currents. This can lead to strong currents in the Port of Albany.
- There is a lack of real-time sensors/data.

- Tides and currents could impact oil spill containment and clean up.
- Currents don't exceed 5 kts, unless there is an extreme weather event.
- Opposing winds and currents can create chop that is difficult for paddle craft.
- Water releases and freshets can increase risk. Sometimes these events can even pull buoys under the water.
- Water movement is generally not well understood by recreational boaters.

Existing Mitigations:

- Transits and passing arrangements are planned according to tide and current predictions.
- Tidal predictions are accurate, especially since the models were updated with new data.
- Voyage plans incorporate keel clearance.
- Local area knowledge and broadcast communication mitigate risk associated with water movement.
- NOAA maintains tide and current sensors, and they are committed to updating them.

Visibility Restrictions:

Trends/Observations:

- Fog can be patchy, but it's a game changer for commercial traffic. Pilots and tug captains will avoid fog, which means they will try to anchor or remain moored.
- Fog is seasonal. It is usually worse in the spring and fall.
- Fog can be dangerous for kayakers as well. If kayakers must go out in the fog, they tend to stick close to the shore.
- Commercial fisherman must go out to save their nets, regardless of restricted visibility. Fixed nets were traditionally set below Peekskill.
- According to the National Climate Data Center, there are about 25 days of dense fog a year in the Hudson Valley. However, this might not accurately describe conditions on the river.
- There are microclimates on the river, and visibility conditions can change rapidly.
- Heavy rain and snow can be worse than fog because it clutters the radar.
- Glare can be a problem on clear days.

Existing Mitigations:

- There is great communication on the waterway. Mariners will seek visibility information from other vessels underway.
- Captains and pilots have the authority to terminate a voyage because of restricted visibility. They will not proceed north to the narrow sections if visibility is poor.
- If already underway, anchoring is the primary mitigation strategy.
- Technology helps, but its benefits are limited due to the narrowness of the channel.

Obstructions:

Trends/Observations:

- Bridges can be obstructions. Pilots prefer 2-3 ft of excess air draft.
- Cable and pipelines are obstructions, and some aren't charted.
- Ice is major obstruction. Some crews lack experience in ice. Ice drags buoys off station, and it is difficult to meet or overtake in ice. Vessel interactions with ice can break docks and marina infrastructure.
- Commercial traffic can destroy fishing nets. Not a relevant issue for today's fishing practices.
- Most incidents have occurred near reefs. They are obstructions, but they are habitat for aquatic resources.
- Some fuel storage locations have transfer pipes that protrude onto the pier.
- Sometimes kayakers are mistaken for debris fields or birds.

Existing Mitigations:

- Communication between captains/pilots and USCG cutters improve the effectiveness of ice breaking operations.
- Ice operations are well managed. The USCG has an annual ice breaking meeting and conducts daily overflights.
- Captains and pilots are experienced in ice.
- Vessels form convoys that are escorted by a USCG ice breaker.
- Commercial vessels will slow down to limit wake damage to private structures and docks. However, this isn't always effective.
- There are horsepower restrictions during the ice season.
- The USACE has a crane barge on the river, and it's capable of removing obstructions.
- Mariners report obstructions and warn others.

Visibility Impediments:

Trends/Observations:

- Background lighting is bad near Catskill, Newburgh Water Plant, Tarrytown, Haverstraw Bay, and Albany.
- There are dark shadows near Hudson.
- Port of Coeymans can be lit up.
- Silver Point Range near German Reach can be too bright. Sometimes it's blinding.
- There are some blind spots for AIS and VHF coverage, especially in the Hudson Highlands.

Existing Mitigations:

- Commercial operators communicate well when approaching turns and bends. Some recreational boats listen to this communication.
- There are minimum lighting requirements for stationary barges.
- Vessels carry a chart and VHF radio.

Dimensions:

Trends/Observations:

- Up to Kingston the channel is 600 ft wide. Above Kingston the channel is 400 ft wide. Project depth is 32 ft.
- The channel is constantly shoaling, and shoaling affects a ship's movement.
- Pilots will review recent surveys, and avoid meeting in shallow areas.
- There are certain areas where commercial vessels will avoid meeting. Meeting locations are usually planned well in advance. Communication is key.

Existing Mitigations:

- Shipping companies will limit their draft based on under keel clearance calculations. If the calculations don't match reality, they won't make the trip.
- Mitigations from other categories also apply to dimensions.

Bottom Type:

Trends/Observations:

- Eel grass is in shallow areas where light meets the bottom.
- Short-nosed and Atlantic sturgeon require a hard bottom for spawning. Some areas with a hard bottom are just above Hyde Park, Poughkeepsie Yacht Club, and across from Esopus Meadows Light.
- New York State has designated some bottom types as critical habitats.
- Sand wave bottoms are important habitat for sturgeon. This bottom type is near Crum Elbow.
- North of Kingston and in the Hudson Highlands is rocky and narrow.

Existing Mitigations:

- Bottom types are charted and publically available.
- USACE and state permits regulate submerged or overhead cables.
- The river was recently surveyed by NOAA.

Configuration:

Trends/Observations:

- Many turns are greater than 45 degrees.
- Many secondary channels/creeks meet the river. For example, Rondout Creek in Kingston.

Existing Mitigations:

- Passing arrangements are carefully coordinated.
- Technology helps determine ideal meeting locations for vessels.
- Pilots rarely transit between Hudson and Albany at night.

Human Injuries:**Trends/Observations:**

- Haverstraw Ferry can have about 150 passengers.
- The Dutch Apple has a capacity of about 125 passengers.
- JP Cruise lines can carry over 200 passengers.
- Small cruise ships are seasonal and can carry up to 300 passengers.
- The Rip Van Winkle, the Spirit of the Hudson, and the Eureka can have 150-200 passengers.
- There is a high-speed ferry from NYC to Cold Spring.
- The Pride of the Hudson in Newburgh can carry about 75 people.
- Seastreak Ferry can carry up to 500 passengers. They have a fall foliage cruise on the Hudson River.
- Surge of water from commercial vessels may injure owners of beached vessels or people on floating docks.
- Towing companies will not looking into a potential hire's credentials or medical waivers.

Existing Mitigations:

- Local authorities train at least monthly. Some exercises are with interagency and local partners.
- Passenger vessels must do drills as part of USCG inspections. They also must have emergency response plans.
- There is search and rescue training available at the Port of Albany.
- Commercial operators must have physical exams to maintain Coast Guard credentials. These are well documented, and the requirements are enforced.

Petroleum Discharge:**Trends/Observations:**

- Most petroleum moves by tank barge. Tank barges are usually 80,000 barrels, and the largest tank barges are 150,000 barrels. Most units are articulated tug barges.
- There are petroleum and asphalt tankers.
- Barge drafts range from 19-30 ft, depending on cargo type and amount.
- You can never clean up all the spilled oil.
- Equipment may not be provided quickly enough, and local authorities may not be experienced in spill response.

Existing Mitigations:

- Aids to Navigation Team Saugerties has a USCG oil spill response kit.
- The Oil Spill Removal Organization (OSRO) has response equipment staged along the river. The OSROs work together. They are annually inspected by the USCG and their clients. They serve vessels and facilities. They are well versed in emergency response operations.
- Port facilities have oil spill response equipment, and they are evaluated on their ability to use the equipment.
- There are large spill response exercises involving multiples agencies and stakeholders.
- The USCG maintains an area contingency plan. It covers local, state, and federal responsibilities. It is a 1000-page document that is comprehensive. The committee meets monthly.
- Vessel quality and crew training prevent spills.
- Vessels and facilities have response plans.
- There are advanced oil spill models.
- OSROs are subject to government initiated, unannounced exercises.
- 1000 ft boom must be deployed within 1 hr and vacuum equipment must be onscene within 2 hours. Tier 1 equipment is well staged and would be onscene quicker than 12 hours.
- Facilities are well lit and extensively inspected before, during, and after the offload of petroleum products.
- Petroleum offload/onload hose gaskets are replaced before every use.
- Hoses on barges are pressure tested every year and replaced every 5 years.
- The state has established geographic response plans (GRPs), and the USCG has geographic response strategies (GRSs).
- The state does training with local fire departments, and state response assets are robust.
- The USCG and state have funds dedicated to responses. These can be used if there isn't a responsible party.
- The USCG has a national response center that manages notifications.
- Mariners must report all spills, regardless if they caused it.

Hazardous Materials Release:

Trends/Observations:

- Liquid fertilizer, urea, molasses, calcium chloride, magnesium chloride, and ethanol are transported on the river.
- Some of the tankers carrying hazardous cargos exceed 40,000 DWT.

Existing Mitigations:

- Some mitigation strategies are covered in the “Petroleum Discharge” section.
- Recovery efforts depend on the environmental fate of specific chemicals.

Mobility:

Trends/Observations:

- According to modeling, a worst-case discharge (150,000 barrels of petroleum) in Kingston would spread from Saugerties to Yonkers. It would impact traffic on the entire stretch because the river is narrow.
- A petroleum spill would likely result in a waterway closure.
- The river will shut down if a vessel runs aground.

Existing Mitigations:

- Closures are continually monitored and assessed by the Captain of the Port.
- The Port of New York adds salvage and heavy lift resources.
- The USCG can activate its marine transportation system recovery unit (MTSRU).

Health and Safety:

Trends/Observations:

- There are 7 different water intakes on Hudson River. Most are near Kingston and Poughkeepsie. There are no backups for these drinking water systems.
- About 1.5 million people live on the water from Yonkers to Albany.
- Home heating oil is a important commodity. Inability to ship refined petroleum products could impact the health and safety of the region.

Existing Mitigations:

- The national response center notifies appropriate authorities.
- The state health department has water quality rapid response teams.

- The state watch center has a system to bring all agencies and expertise together.
- There are state grants and mechanisms to fund health/safety recovery efforts.

Environmental:

Trends/Observations:

- The state has designated most of the river a significant habitat.
- The freshwater wetlands above the salt line are globally rare.
- There are locations, such as Con Hook and Diamond Reef, where navigational hazards are close to sensitive habitats.
- The river is the largest superfund site in the nation. It is vulnerable to pollution because it has already been polluted so much.
- Sinking oils could have serious impacts because some of the fish are benthic.
- Contrary to popular belief, the Hudson River is not healthy. The fisheries have collapsed.
- Some portions of the river have been designated essential fish habitat by NMFS.

Existing Mitigations:

- There are ongoing cleanup and remediation efforts.
- The predictive modeling has aspects related to long-term environmental consequences.
- There is an ongoing effort to update the area contingency plan (ACP). Updates so far have greatly improved preparedness.
- There are habitat maps available that outline critical habitat areas. These areas are included in the new ACP.

Aquatic Resources:

Trends/Observations:

- Striped bass is the number one recreational species in the United States. The Hudson River is 1 of 3 producing estuaries for striped bass in the United States.
- The Hudson River estuary is important for the health of fisheries along the eastern seaboard. The marshes and tidal stretches are important spawning areas for the Atlantic coast herring, striped bass, blue fish, and blue crab.
- Commercial fishing has existed on the Hudson, but it doesn't exist right now. Just because it doesn't exist, doesn't mean it's not important.
- There is subsistence fishing on the river, and there is recreational fishing.
- Eating fish from the river can be dangerous because they are contaminated.

Existing Mitigations:

- This topic was covered in the “Environmental” section.
- There are recreational fishing regulations.
- There are efforts to clean up the river and decrease fish contamination.

Economic:**Trends/Observations:**

- The river has spawning grounds and are important to fisheries along the entire eastern seaboard.
- Disruptions to home heating oil and gasoline shipments could have a regional impact. It would be difficult to find an alternative transportation system, and prices would skyrocket.
- Expensive, heavy lift cargo is also important. Some pieces of equipment are shipped internationally.
- The river is important to tourism, and tourism drives the local economy. Tourism is susceptible to river pollution.
- There is a passenger and cargo rail line on the river. An issue with the rail line could impact the waterway.
- On an average day, 5 million gallons of fuel are shipped on the river. This equates to about 400 trucks per day.
- A New York City economic study suggested barges in New York Harbor eliminated 3.1 million trucks per year.

Existing Mitigations:

- Cargo could be rerouted to other cities.
- The Marine Transportation System Recover Unit (MTSRU) would minimize economic impact. There are thresholds and guidelines for standing up the MTSRU.
- Maintaining the MTS is one of the Coast Guard’s top priority.
- The Hudson River is extremely vital to the regional economy, and reducing all risk is difficult.
- There are not enough trucks to transport the fuel oil shipped on the Hudson River.
- The state does table top exercises that include contingency operations for port disruptions.
- The state is completing a regional resilience assessment program. It reviews every piece of energy infrastructure in the state.
- Vessels can anchor nearby and restart operations immediately.

Appendix D

Poughkeepsie Participants – Potential Additional Risk Mitigation Strategies

The participants are the local subject matter experts, and these comments capture their opinions, providing a general sense of the ideas discussed during the workshop. They also provide various perspectives concerning each risk mitigation strategy representing widely different interests.

Small Craft Quality:

- Create a Hudson River Harbor Safety Committee.
- Create a Hudson River specific website with boating information; post the link on signs at marinas.
- Promote vessel safety education at small craft launch points and marinas, use local parks and recreation officials to promote boating safety.
- Place signs near launch points and marinas that highlight the danger of large vessels in the channel.
- Dedicate more law enforcement resources and increase outreach efforts.
- Encourage the use of VHF marine radios by small craft operators.
- Implement a mandatory small craft operator licensing program.
- Increase recreational boating regulations and requirements.
- Develop a video describing “best practices” for commercial/recreational interactions on the water, incorporate traffic mix and other local information in boating safety courses.
- Create an industry and kayaker exchange program.
- Expand the boating safety courses to cover more aspects of commercial traffic.
- Develop a brochure that “big box” stores can distribute when they sell paddle craft.
- Encourage manufacturers to put safety decals and reflectors on paddle craft.

Traffic Mix:

- Incorporate traffic mix and other local information in boating safety courses.
- Establish a Hudson River Harbor Safety Committee.
- Improve long-range and/or contingency planning and better coordinate activities, improve dialogue between waterway users and stakeholders.
- Require mandatory training for small craft operators, kayakers and paddle boards that emphasizes the risks of operating near commercial vessels.
- Increase outreach and voluntary boating safety programs.
- Expand AIS coverage.
- Required small craft to carry VHF radios.

- Require regatta sponsors to be escorted by a vessel that has a VHF radio.
- Expand training opportunities for small craft operators, kayakers and paddle borders.
- Place signs at marinas that include how to access safe boating information and education resources.

Congestion:

- Establish a Hudson River Harbor Safety Committee.
- Improve coordinating and planning between the different waterway user types.
- Incorporate traffic mix and other local information in boating safety courses.
- Expand the VTS in New York to cover the Hudson River to Albany.
- Federally designate historically used anchorages.
- Establish a Regulated Navigation Area for the entire river.
- Increased information sharing on traffic congestion.
- Promote increased training for tour boat operators, require the carriage of VHF radios on tour boats.
Improve the ability to communicate bridge-to-bridge or ship-to-shore.

Water movement:

- Increase the number of real-time data sensors for tides, currents, and bridge air gaps.
- Improve accuracy of existing navigation and hydrographic sensors.
- Expand AIS coverage and information sharing.
- Expand NOAAs Physical Oceanographic Real-Time System to cover the Hudson River to Albany.
- Expand the VTS in New York to cover the Hudson River to Albany.

Visibility Restrictions:

- Make bridge cameras accessible to the maritime community.
- Expand NOAAs Physical Oceanographic Real-Time System to cover the Hudson River to Albany.
- Expand the VTS in New York to cover the Hudson River to Albany.
- Improve information sharing between from federal stakeholders (USCG, NOAA, etc) and waterway users.
- Establish federally designated anchorages. Define “emergency” in the anchorage regulations. Establish anchorage areas that are for “emergency” only. The definition of emergency should not include parking or staging. In the anchorage regulations, replace the word “emergency” with “for purposes of safe navigation”. The anchorages should be available, clearly marked, and used for short-term emergency purposes. Eliminate “long-term” from the anchorage regulations.
- Relax conditions allowing vessels to anchor for something less than a “great emergency” such as adverse weather or a mechanical condition.
- Designate anchorages in appropriate and strategic locations, and define time limits and the definition of emergency or circumstantial anchoring.

- Establish a Regulated Navigation Area for the entire river.
- Expand AIS coverage.

Obstructions:

- Establish federally designated anchorages.
- Define “emergency” in federally designated anchorages.
- Expand AIS coverage.
- Improve clearing of debris from the river.
- Improve ice breaking capacity.

Petroleum Discharge:

- Encourage reporting of spills by the public.
- Increase types and quantities of emergency response equipment to increase response capability.
- Conduct dispersant modeling to evaluate impacts.
- Provide funding for equipment for local emergency responders.
- Display contact information to report spills on signs at small boat marinas and boat ramps.
- Improve long-range and/or contingency planning and better coordinate activities.
- Improve dialogue between waterway users, stakeholders, emergency responders and members of the general public
- Conduct an inter-agency emergency response drill for the upper Hudson River.
- Train local responders on contents and use of the Federal Government Area Contingency Plan (ACP).

Economic:

- Identify resources for individuals to seek compensation when they have been impacted by a spill, ensure redundancy in the supply of resources to impacted communities, increase Federal and State relief funding.
- Provide education for the general public on the Oil Spill Liability Trust Fund.
- Prohibit oil laden barges to remain at anchorage in order to avoid and prevent the economic impact of spills.
- Increase the types and quantities of emergency response equipment to increase response capability.
- Increase storage capacity for heating oil reserves.
- Increase ice breaking capacity.
- Develop emergency response plans that provide for alternate heating oil transportation.
- Provide funding for equipment for local emergency responders.

Appendix E

Albany Participants Comments – Potential Additional Risk Mitigation Strategies

The participants are the local subject matter experts, and these comments capture their opinions, providing a general sense of the ideas discussed during the workshop. They also provide various perspectives concerning each risk mitigation strategy representing widely different interests.

Small Craft Quality:

- Establish a Hudson River Harbor Safety Committee.
- Increase Boating While Intoxicated enforcement.
- Expand education on importance of Personnel Flotation Device usage.
- Extend Boating While Intoxicated (BWI) laws to kayak and paddle craft operators.
- Improve US Coast Guard Auxiliary presence, outreach, and courtesy inspections.
- Pay US Coast Guard Auxiliary members to improve membership.
- Host a “Captains and Paddlers” exchange event on the Hudson River.
- Increase Federal grant money for State National Boating Safety Programs.
- Rebuild local boating safety outreach programs - people that go from marina to marina.
- Implement stricter boating safety education requirements.
- Increase the number of on the water training programs.

Volume of Small Craft Traffic:

- Require small craft liability insurance similar to automobile insurance requirements.
- Require an on water practical examination and licensing for small craft operators.
- Expand boating safety education and outreach programs.
- Require mandatory boating safety education, training and licensing for small craft operators.
- Automatically issue small craft operator licenses, but make them subject to revocation for serious violations such as BWI.
- Require mandatory boating safety education every 10 years and not just for those born after a certain date.
- Increase enforcement of existing boating safety regulations.
- Require carriage of VHF marine radios by small craft operators and monitoring of VHF channel 13.
- Require training on the Inland Navigation Rules of the Road for small craft operators.

Visibility Restrictions:

- Establish a Hudson River Harbor Safety Committee.
- Improve AIS coverage and carriage requirements, install more AIS repeater stations.
- Improve collection and dissemination of real-time weather data.
- Improve the federal presence on the river: EPA, NOAA, USACE, USCG.
- Make Hudson River bridge crossing cameras accessible to the maritime community.
- Expand the VTS in New York to cover the Hudson River to Albany.
- Dredge west of Hudson, so there are channels on both sides of the island.
- Increase frequency of Safety Broadcast Notice to Mariners.
- Install additional Aids to Navigation (ATON).
- Limit vessel sizes so that (vessels) are not tide restricted (due to vessel draft) during their transits
- Establish commercial moorings.
- Do not categorically excluded anchorages from National Environmental Policy Act (NEPA) requirements.
- Define “Great Emergency” in the anchorage regulations.
- Specify time limits for anchorages.
- Avoid placing anchorages in aquatic habitat areas.
- Implement federal anchorages as proposed in the ANPRM.

Aquatic Resources:

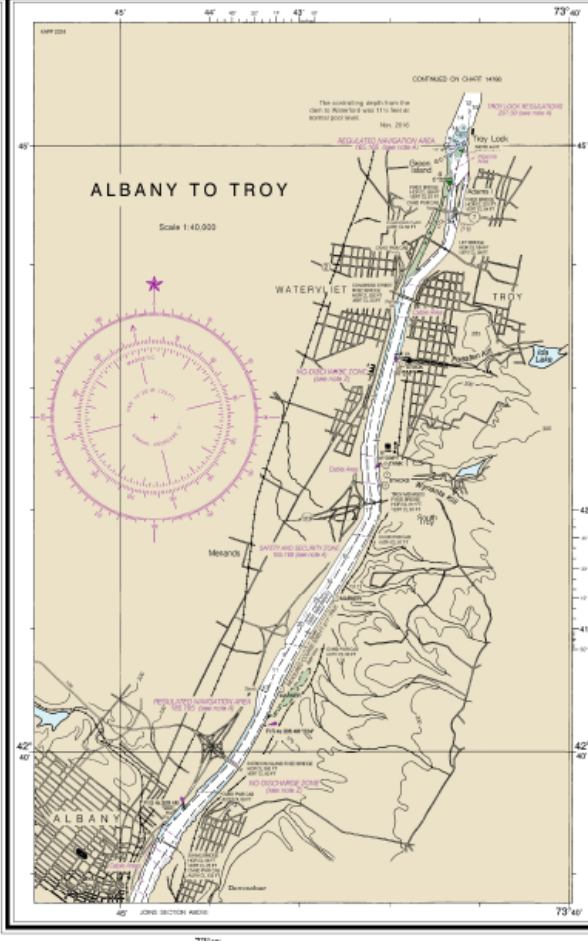
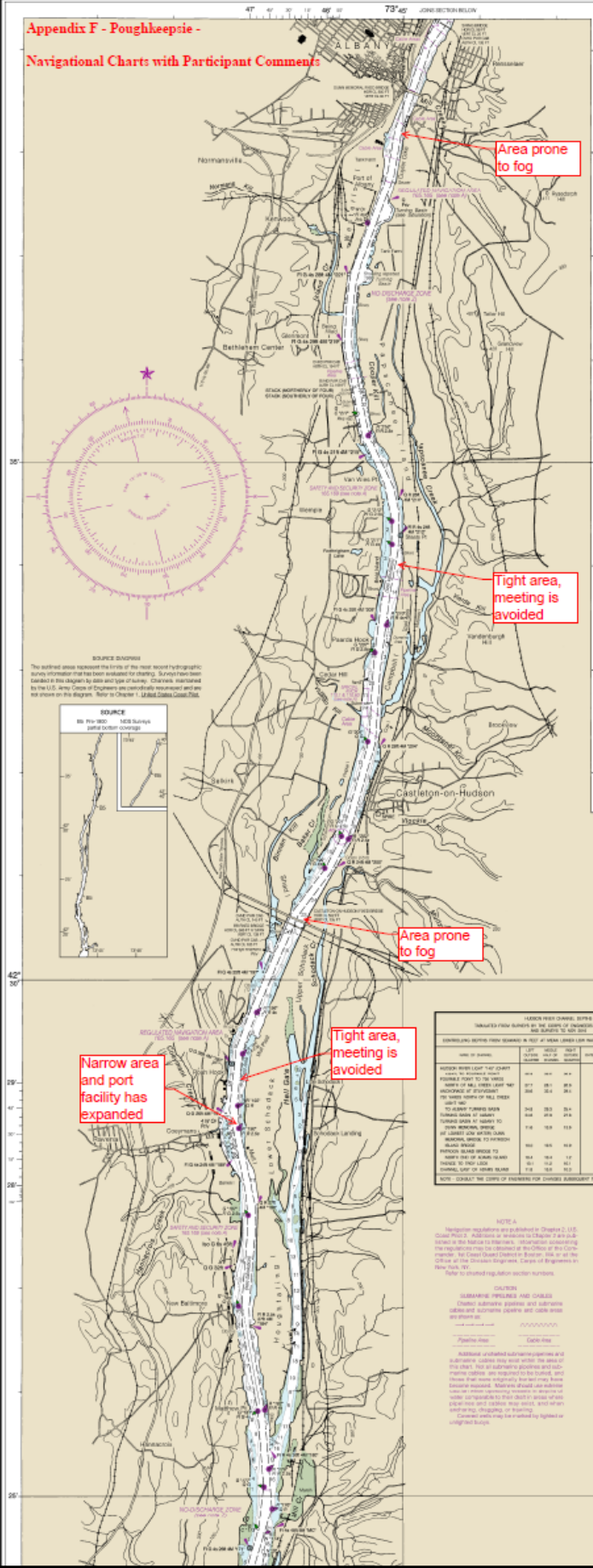
- Ensure contingency plans identify sensitive area for booming.
- Place aquatic habitat and spawning locations on navigational charts.
- Prohibit fishing in close proximity to power plants.
- Conduct more aquatic resource studies.
- Expand emergency response capabilities and resources.
- Dredge remaining PCB's from the Hudson River.
- Improve hazardous materials spill preventative measures in environmentally sensitive areas.
- Increase the types and quantities of emergency response equipment to increase response capability.
- Improve long-range contingency planning and better coordinate activities.
- Create a dynamic relationship between the shipping industry and fishery biologists to identify locations for anchorage areas.
- Enhance communications between the shipping industry and waterway users.
- Restore local knowledge of the importance of Hudson River aquatic resources.

- Increased enforcement of fisheries regulations.
- Increase inventories of emergency response equipment.
- Expand the VTS in New York to cover the Hudson River to Albany to increase spill response capabilities.
- Be proactive and aggressively champion the management of Hudson River species.
- Improve capability to immediately respond and protect critical habitats.

Appendix F

Poughkeepsie - Navigation Charts with Participant Comments

Appendix F - Poughkeepsie -
Navigational Charts with Participant Comments



LOCK PASS SCHEDULES

LOCK NAME	TYPE	NO. OF CHAINS	NO. OF CHAINS	NO. OF CHAINS	NO. OF CHAINS	NO. OF CHAINS	NO. OF CHAINS	NO. OF CHAINS	NO. OF CHAINS
ALBANY LOCK	1	1	1	1	1	1	1	1	1
WEST TROY LOCK	1	1	1	1	1	1	1	1	1
TROY LOCK	1	1	1	1	1	1	1	1	1

NOTE A
Navigation regulations are published in Chapter 2, U.S. Coast Pilot 2, Regulations for the Hudson River, Albany to Troy, New York. Information concerning these regulations may be obtained at the Office of the Commander, New York District, New York, or at the Office of the District Engineer, Corps of Engineers in New York City.

NOTE B
NO ENCLOSURE ZONE, 46 CFR 102

NOTE C
Under the Clean Water Act, Section 303, all vessels discharging raw sewage into navigable waters are prohibited from discharging raw sewage, treated or untreated, into the Hudson River. The Hudson River is designated as a "Special Area" under the Act. The Act prohibits the discharge of raw sewage into the Hudson River. The Act also prohibits the discharge of raw sewage into the Hudson River. The Act also prohibits the discharge of raw sewage into the Hudson River.



UNITED STATES - EAST COAST
NEW YORK
HUDSON RIVER
COXSACKIE TO TROY

Mercator Projection
Scale 1:40,000 at Lat. 42°31'
North American Datum of 1983
(NAD 83) Geospatial System 1984
SOUNDINGS IN FEET
AT HIGHEST LOW WATER
Most lower low water during lowest mean spring

HIGH/75
Height in feet above Mean High Water

Additional information can be obtained at nauticalcharts.noaa.gov.

TELETYPE

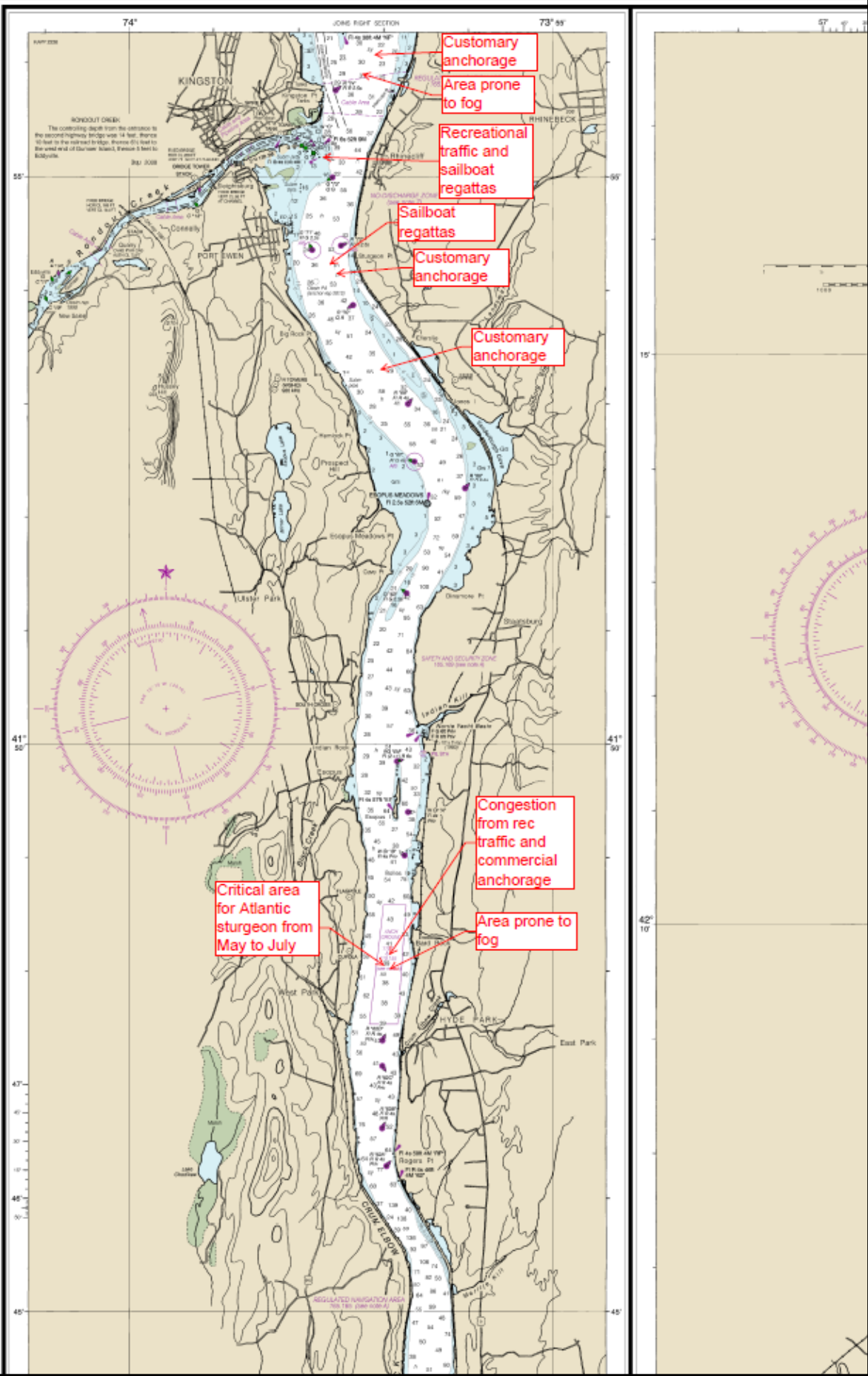
PLAZA	PLAZA	PLAZA	PLAZA
ALBANY	ALBANY	ALBANY	ALBANY
ALBANY	ALBANY	ALBANY	ALBANY
ALBANY	ALBANY	ALBANY	ALBANY

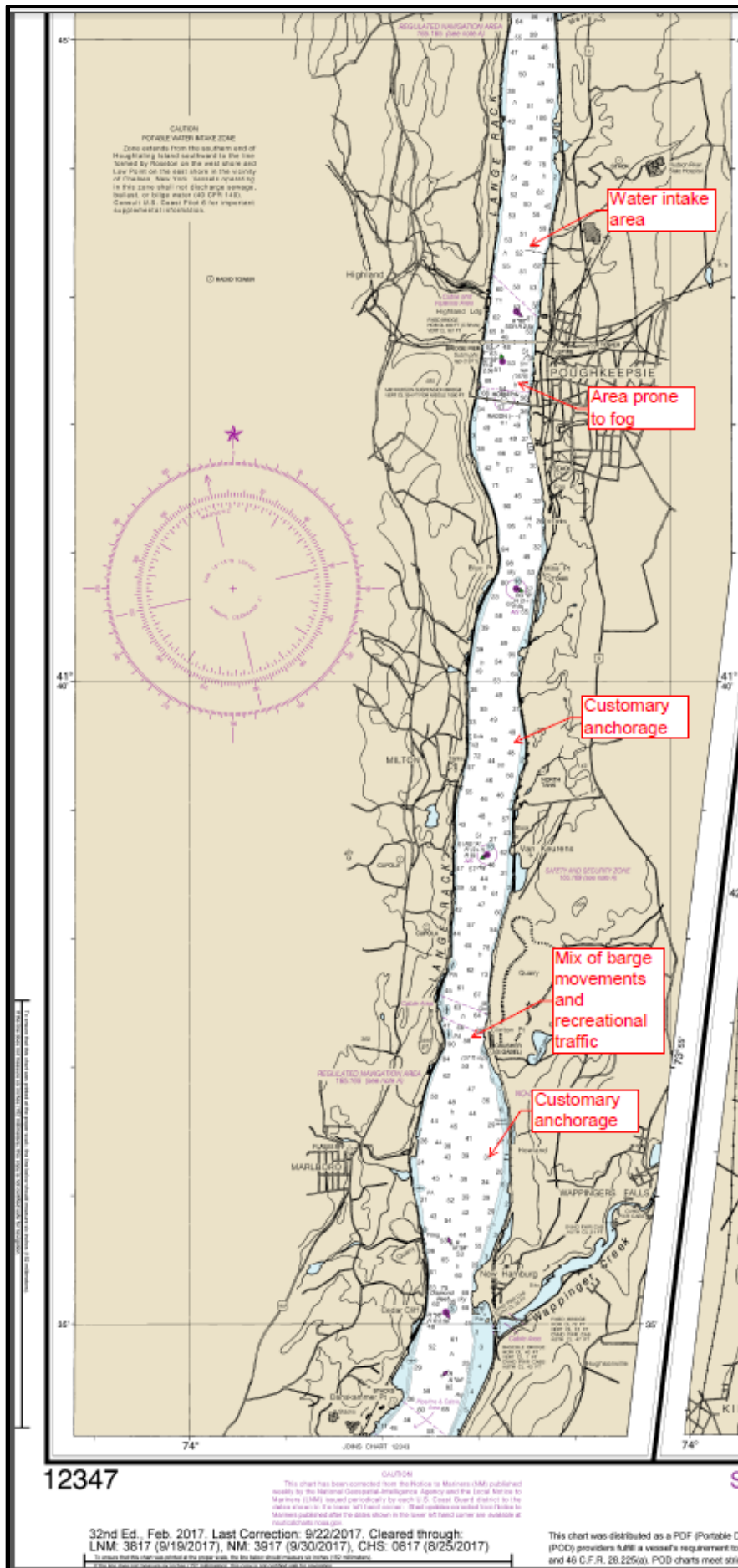
HORIZONTAL DATUM
The horizontal reference datum of this chart is the North American Datum of 1983 (NAD 83), which is the datum used for the geospatial data on this chart. The datum used for the geospatial data on this chart is the North American Datum of 1983 (NAD 83). The datum used for the geospatial data on this chart is the North American Datum of 1983 (NAD 83).

CAUTION
Temperature changes or shifts in tide to navigation are not indicated on this chart. See Local Notice to Mariners.

ASIS TO NAVIGATION
Consent U.S. Coast Guard Light List for

12347





WAPPINGER CREEK TO HUDSON

Mercator Projection
Scale 1:40,000 at Lat. 41°00'

North American Datum of 1983
(Prior to October 1983: Datum 1983)

SOUNDINGS IN FEET
AT HUDSON RIVER DATUM
(Mean low low water during ordinary high tides)

HEIGHTS IN FEET
Unless noted, heights are above Mean High Water

Additional information can be obtained at road side facilities, see page

AUTHORITY
Hydrography, and Sounding by the National Ocean Service, Coast Survey, with additional data from the Corps of Engineers, U.S. Coast Guard, and National Geographic Intelligence Agency

NAME	RAISINGS	Height above datum of sounding (feet)		
		Mean	High	Low
Mean	100	100	100	100
High	100	100	100	100
Low	100	100	100	100

HORIZONTAL DATUM
The horizontal reference datum of this chart is the North American Datum of 1983 (NAD 83), which for plotting purposes is considered equivalent to the World Geodetic System 1984 (WGS 84). Geographic coordinates referenced to the North American Datum of 1983 must be corrected an average of 0.017 meters and a 10" of rotation to agree with this chart.

SUPPLEMENTAL INFORMATION
Consult U.S. Coast Pilot 2 for important supplemental information.

POLLUTION REPORTS
Report all spills of oil and hazardous substances to the National Response Center via 1-800-424-6343 (24 hr. toll free), or to the nearest U.S. Coast Guard Vessel or Air Station communication is impossible (24 CFR 102).

CAUTION
Impaired drainage caused by broken lines are subject to shoaling, particularly at the edges.

POTENTIAL INTERFERENCE
Obstructions to navigation may be present in areas shown on this chart. Obstructions to navigation are shown on this chart. Obstructions to navigation are shown on this chart.

CAUTION
Impaired drainage caused by broken lines are subject to shoaling, particularly at the edges.

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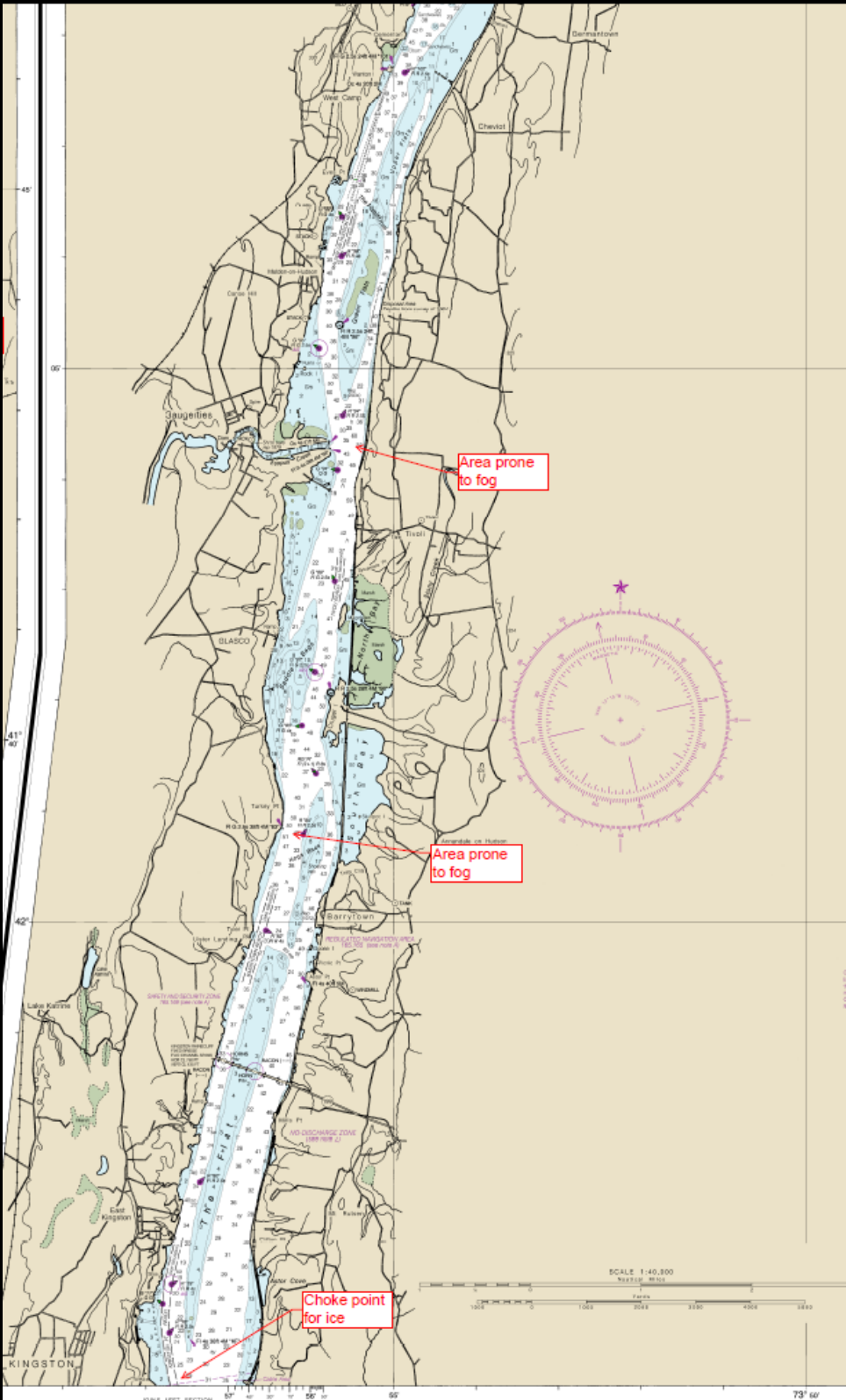
CAUTION
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Impaired drainage caused by broken lines are subject to shoaling, particularly at the edges.



SOUNDINGS IN FEET
Published by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Coast Survey.

Scale: 1:40,000
NAD 83
WGS 84

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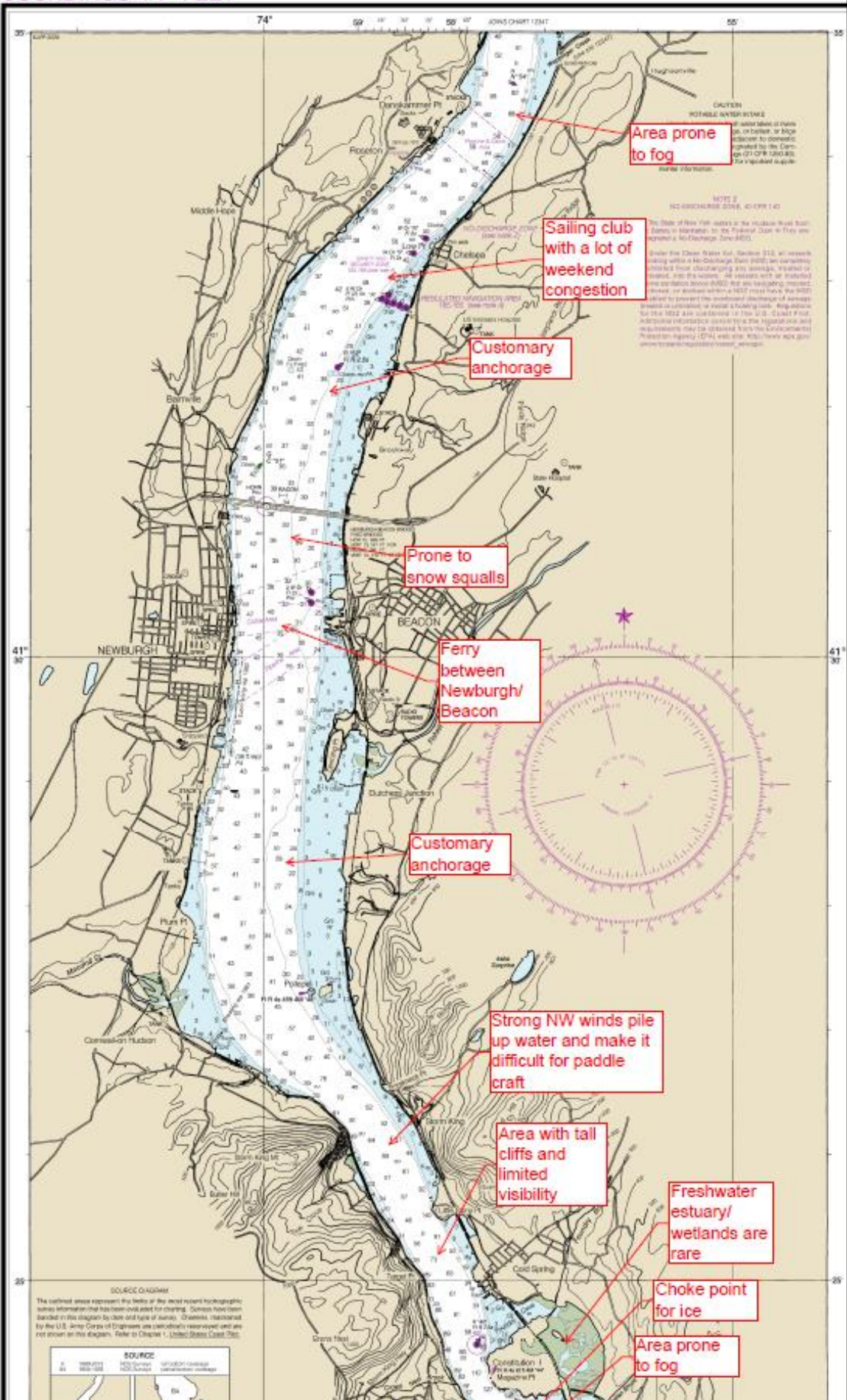
File Document Format. Printing PDFs may alter the chart scale, color, or legibility that may impact suitability for navigation. Printed charts provided by NOAA certified Print on Demand.

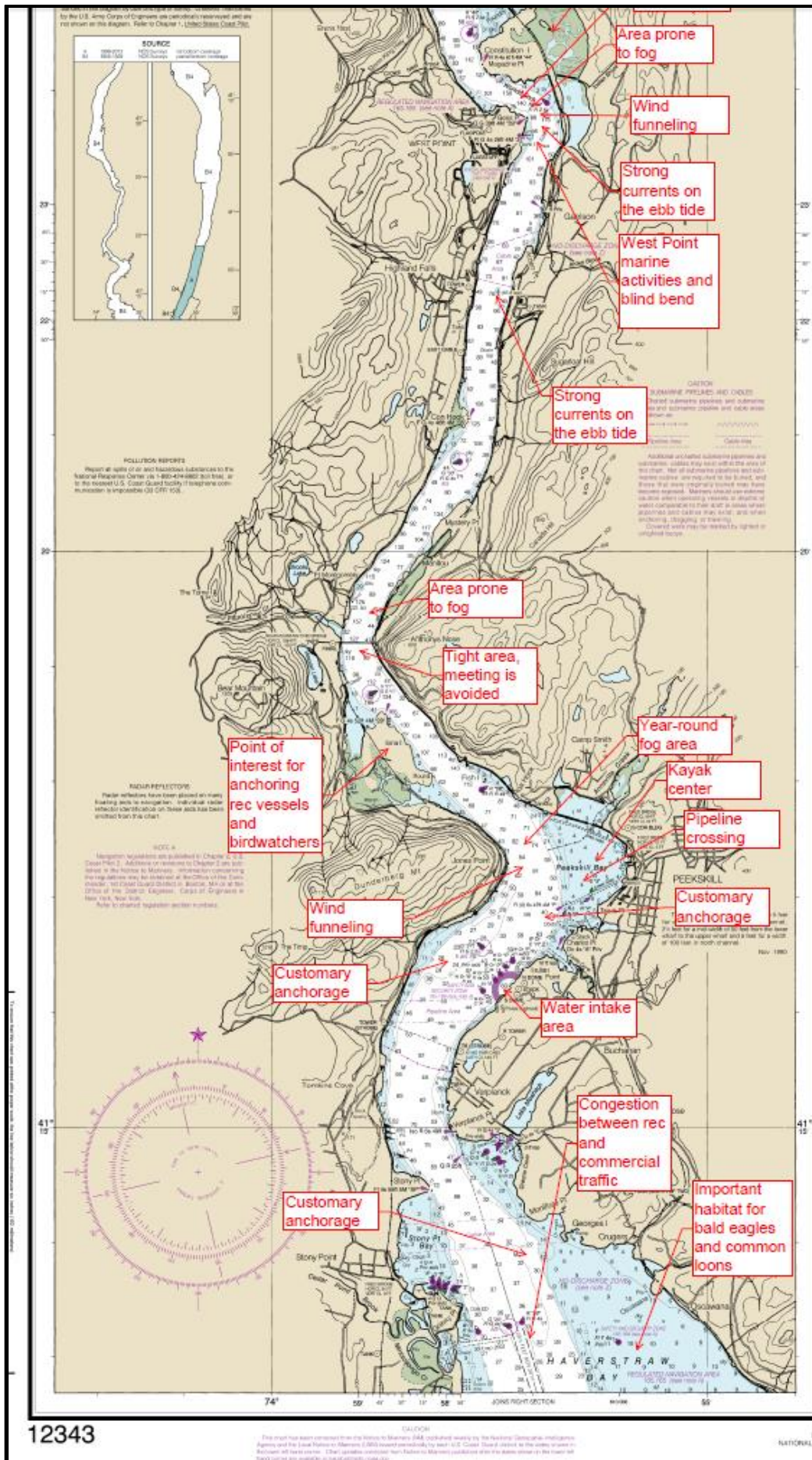
Hudson River - Wappinger Creek to Hudson
SOUNDINGS IN FEET - SCALE 1:40,000

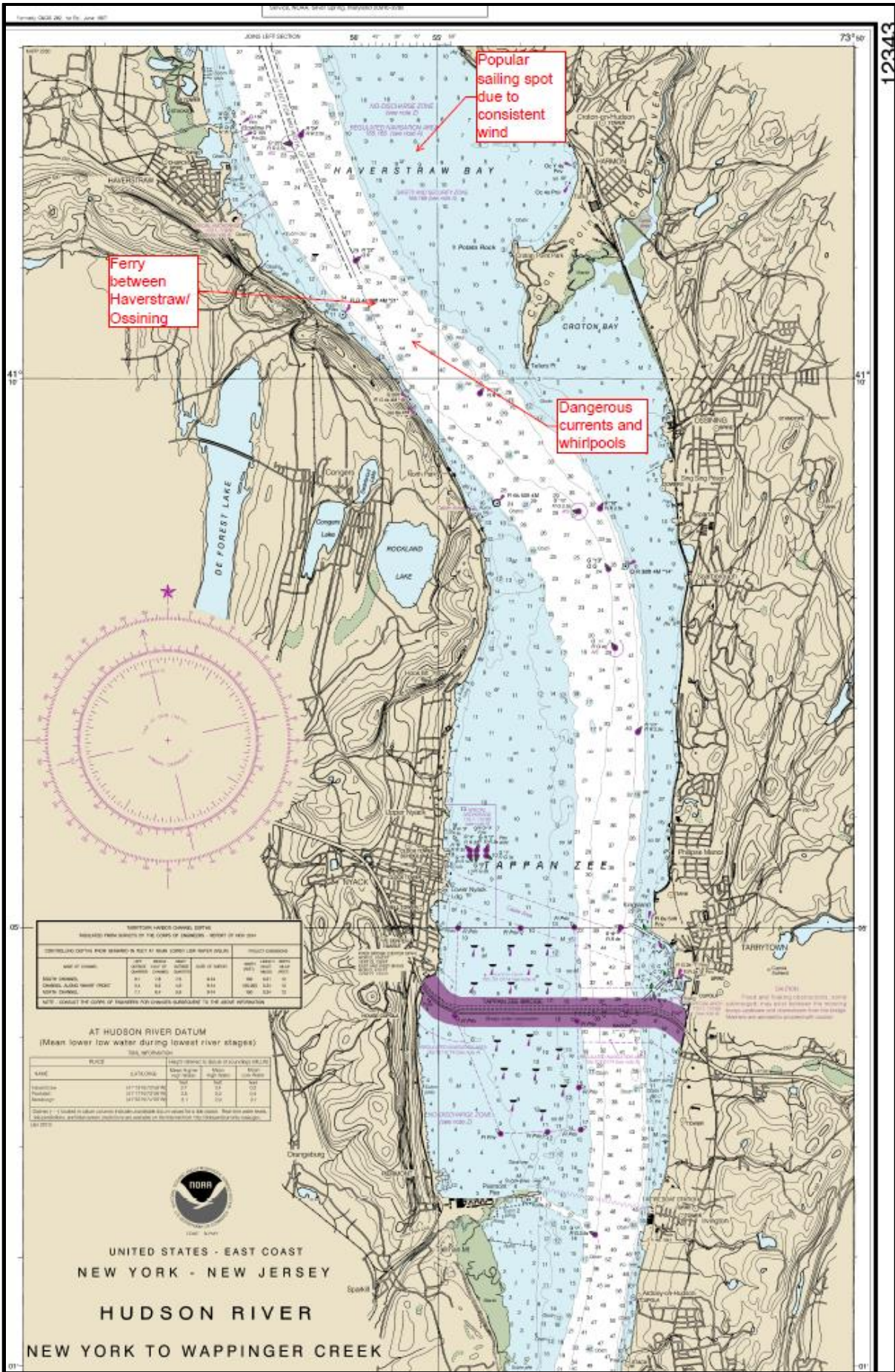
12347

SOUNDINGS IN FEET

12343







SECTION NUMBER: 10000
 SHEET NUMBER: 10000
 DATE: 1/1/2000

SECTION	DATE	REVISION	BY	CHKD	APP'D
10000	1/1/2000	1	J. J. ...	J. J. ...	J. J. ...
10000	1/1/2000	2	J. J. ...	J. J. ...	J. J. ...
10000	1/1/2000	3	J. J. ...	J. J. ...	J. J. ...
10000	1/1/2000	4	J. J. ...	J. J. ...	J. J. ...
10000	1/1/2000	5	J. J. ...	J. J. ...	J. J. ...
10000	1/1/2000	6	J. J. ...	J. J. ...	J. J. ...
10000	1/1/2000	7	J. J. ...	J. J. ...	J. J. ...
10000	1/1/2000	8	J. J. ...	J. J. ...	J. J. ...
10000	1/1/2000	9	J. J. ...	J. J. ...	J. J. ...
10000	1/1/2000	10	J. J. ...	J. J. ...	J. J. ...

AT HUDSON RIVER DATUM
 (Mean lower low water during lowest river stages)
 TIDE INFORMATION

NAME	DATE	TIME	HEIGHT	LOWEST	HIGHEST
10000	1/1/2000	12:00	1.0	0.0	2.0
10000	1/1/2000	12:00	1.0	0.0	2.0
10000	1/1/2000	12:00	1.0	0.0	2.0
10000	1/1/2000	12:00	1.0	0.0	2.0
10000	1/1/2000	12:00	1.0	0.0	2.0
10000	1/1/2000	12:00	1.0	0.0	2.0
10000	1/1/2000	12:00	1.0	0.0	2.0
10000	1/1/2000	12:00	1.0	0.0	2.0
10000	1/1/2000	12:00	1.0	0.0	2.0
10000	1/1/2000	12:00	1.0	0.0	2.0

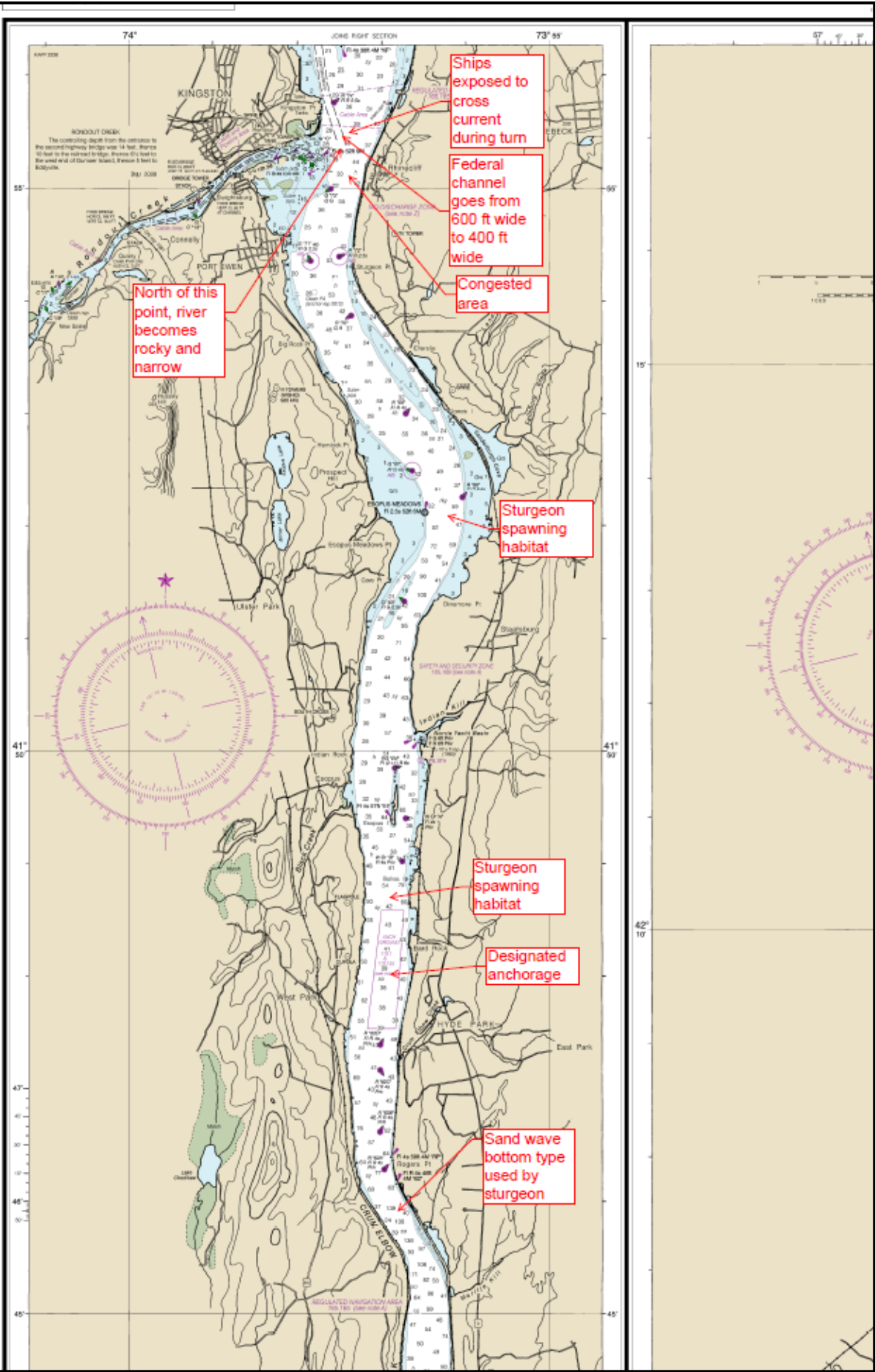


UNITED STATES - EAST COAST
 NEW YORK - NEW JERSEY
HUDSON RIVER
 NEW YORK TO WAPPINGER CREEK

Appendix G

Albany - Navigation Charts with Participant Comments

12347



Ships exposed to cross current during turn

Federal channel goes from 600 ft wide to 400 ft wide

Congested area

North of this point, river becomes rocky and narrow

Sturgeon spawning habitat

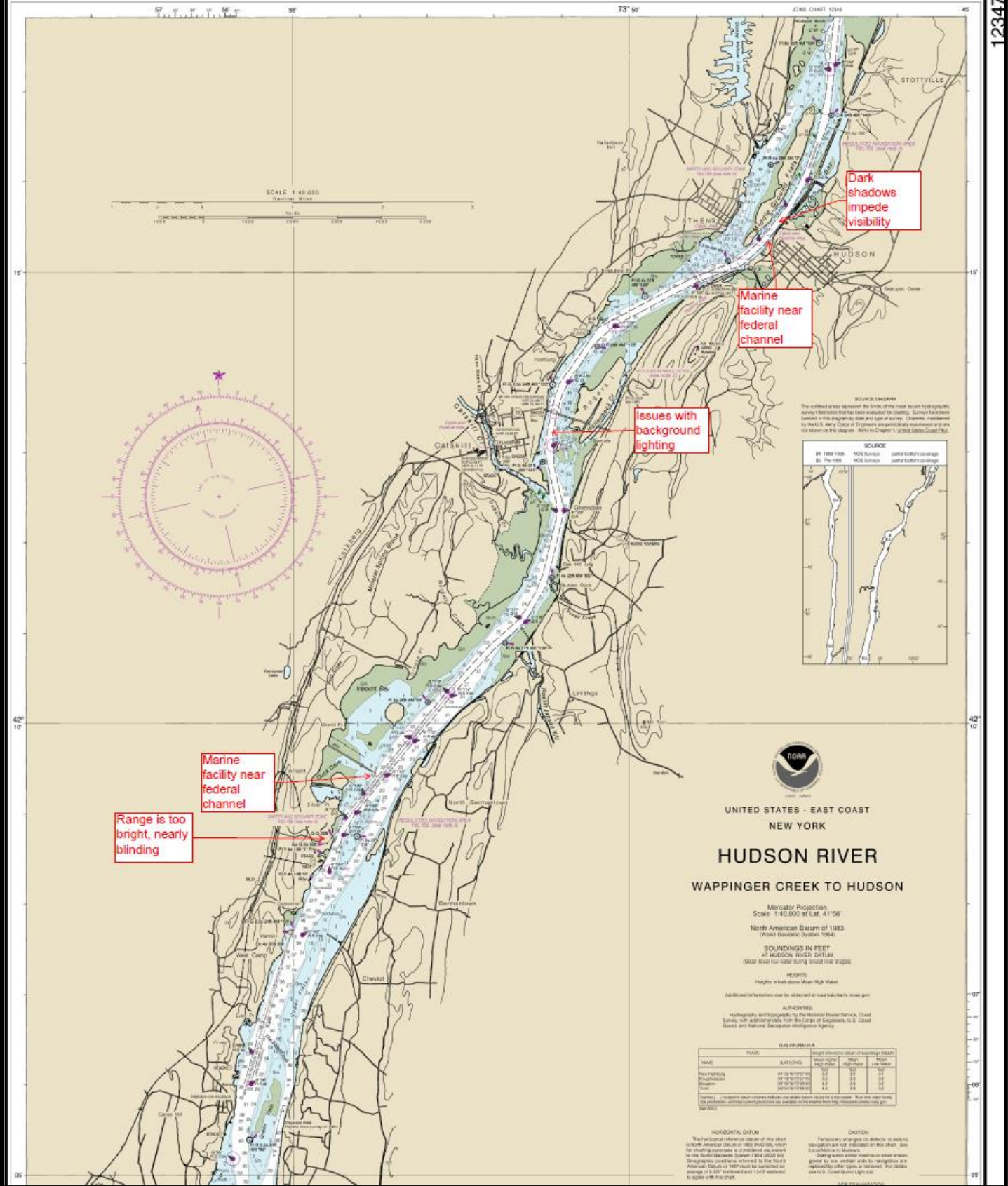
Sturgeon spawning habitat

Designated anchorage

Sand wave bottom type used by sturgeon

SOUNDINGS IN FEET

12347



Range is too bright, nearly blinding

Marine facility near federal channel

Marine facility near federal channel

issues with background lighting

Dark shadows impede visibility

WAPPINGER CREEK TO HUDSON

Mercator Projection
Scale 1:40,000 at Lat. 41°50'
North American Datum of 1983
(WGS 84 Geoid System 1984)

SOUNDINGS IN FEET
AT HUDSON RIVER DATUM
(Must be used for rising stage during lowest low stage)

HICHO10
Heights in feet above Mean High Water

Additional information can be obtained at nautical.usa.gov

AUTHORITY
Hydrographic and bathymetric by the National Ocean Service Coast Survey, with additional data from the Corps of Engineers, U.S. Coast Guard, and National Geospatial Intelligence Agency

NAME	PLANS	Height above datum of sounding (MLLW)		
		Mean High Water	High Water	Low Water
Mean sounding	at 10 NAD 83/1983	0.0	0.0	0.0
Highwater	at 10 NAD 83/1983	0.0	0.0	0.0
Lowwater	at 10 NAD 83/1983	0.0	0.0	0.0
Mean	at 10 NAD 83/1983	0.0	0.0	0.0

HORIZONTAL DATUM
The horizontal reference datum of this chart is the North American Datum of 1983 (NAD 83), which for charting purposes is considered equivalent to the World Geodetic System 1984 (WGS 84). Magnetic variation should be determined from the local magnetic declination tables or from the magnetic declination calculator on the U.S. Coast Guard's website at www.uscg.mil and 100% assumed to agree with this chart.

SUPPLEMENTAL INFORMATION
Consult U.S. Coast Pilot 2 for important supplemental information.

POA LITIGATION REPORTS
Present all copies of all full-text and audio recordings to the National Transportation Safety Board via 1-800-424-6343 for free, or to the nearest U.S. Coast Guard office for a fee. For more information, see U.S. Coast Pilot 2.

CAUTION
Improved channels shown by broken lines are subject to shoaling, especially at low stage.

CAUTION
POTENTIAL HAZARD
Shoals and rocks are not shown on this chart. They may be present and should be avoided. Water depths are not guaranteed by the Coast Guard. For more information, see U.S. Coast Pilot 2.

CAUTION
Limitations on the use of radio signals as aids to navigation can be found in the U.S. Coast Guard Light List and that any radio beacon is subject to change. Radio beacons are subject to error and should be used with caution.

CAUTION
Buoys are subject to change. For more information, see U.S. Coast Pilot 2.

CAUTION
Buoys are subject to change. For more information, see U.S. Coast Pilot 2.

CONTOUR	MAGNETIC VARIATION		MAGNETIC DECLINATION	
	1980	2010	1980	2010
100	10.0	10.0	10.0	10.0
200	10.0	10.0	10.0	10.0
300	10.0	10.0	10.0	10.0
400	10.0	10.0	10.0	10.0
500	10.0	10.0	10.0	10.0
600	10.0	10.0	10.0	10.0
700	10.0	10.0	10.0	10.0
800	10.0	10.0	10.0	10.0
900	10.0	10.0	10.0	10.0
1000	10.0	10.0	10.0	10.0

NOTE
Consult the Corps of Engineers for channel alterations to the active waterway.

NOTE 1
Navigation regulations are contained in Chapter 2 of U.S. Coast Pilot 2. Additional regulations for the Hudson River are published in the Hudson River Rules. Information concerning the regulations may be obtained at the Office of the Commander, 1st Coast District, New York, NY, or at the Office of the District Engineer, Corps of Engineers in New York, NY.

NOTE 2
NO-DISCHARGE ZONE, 40 CFR 140
The use of this fish habitat in the Hudson River is subject to the Hudson River Fish Habitat Protection Act (HRRFHPA).

CAUTION
Submarine pipelines and cables are shown on this chart. They are subject to change and should be avoided. For more information, see U.S. Coast Pilot 2.

CAUTION
Submarine pipelines and cables are shown on this chart. They are subject to change and should be avoided. For more information, see U.S. Coast Pilot 2.

NOTE
The NOAA Weather Radio broadcast station for the Hudson River is located at Albany, NY. The frequency is 162.475 MHz. The range is typically 20 to 40 nautical miles from the station, but on the 20 mW station it may be 10 nautical miles or more in high terrain.

ADDITIONAL INFORMATION
This chart is part of the National Ocean Service's Hydrographic Survey. For more information, see U.S. Coast Pilot 2.

SCALE 1:40,000
NAD 83/1983

Published at Washington, D.C.
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE
COAST SURVEY

12347

Hudson River - Wappinger Creek to Hudson
SOUNDINGS IN FEET - SCALE 1:40,000

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Ships exposed to cross current in turn



SOUNDINGS IN FEET

Published at Washington, D.C.
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE
COAST SURVEY

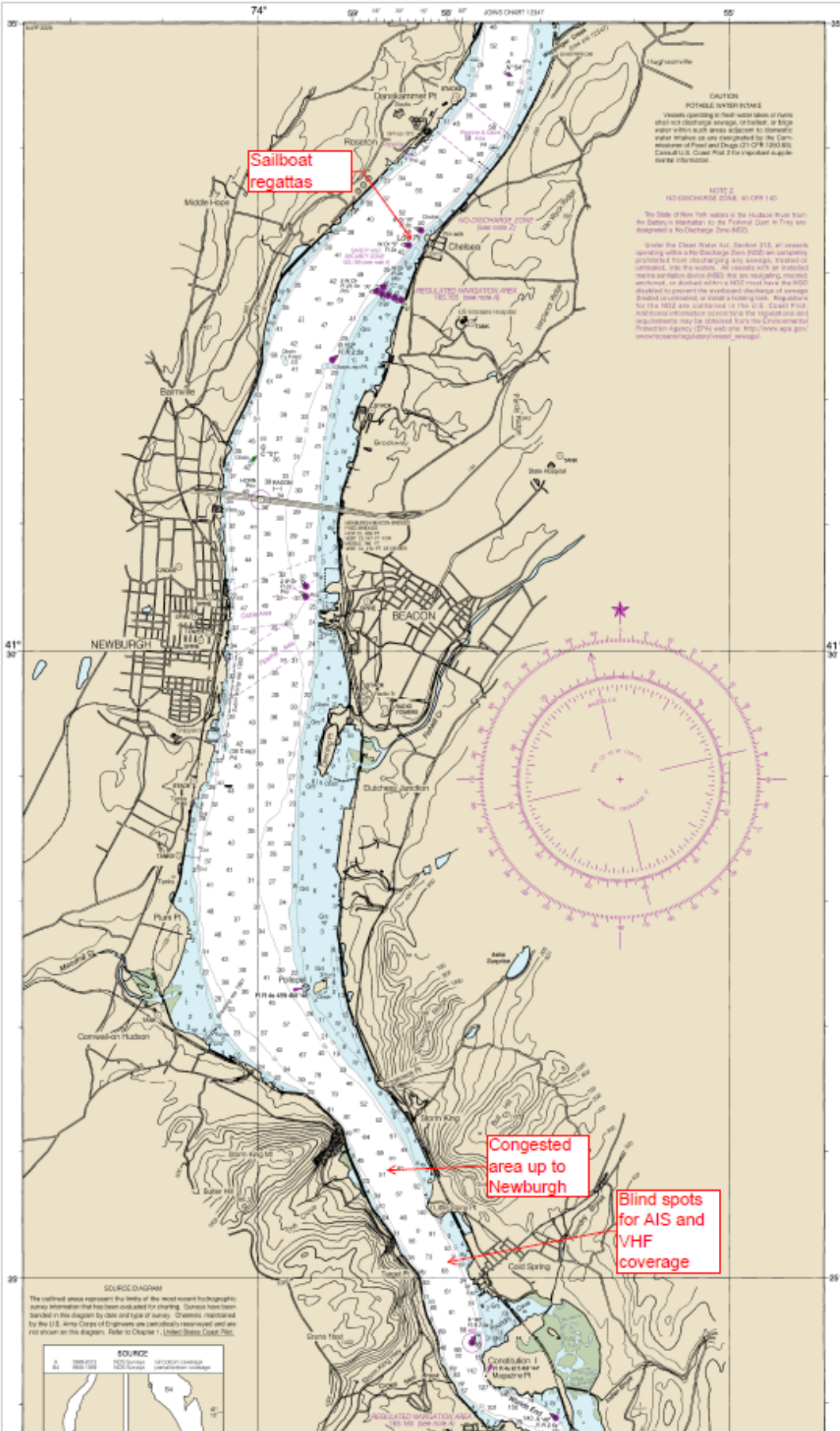
CONTOUR	100	200	300	400	500	600	700	800	900	1000
100	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
200	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
300	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
400	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
500	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
600	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
700	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
800	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
900	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1000	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

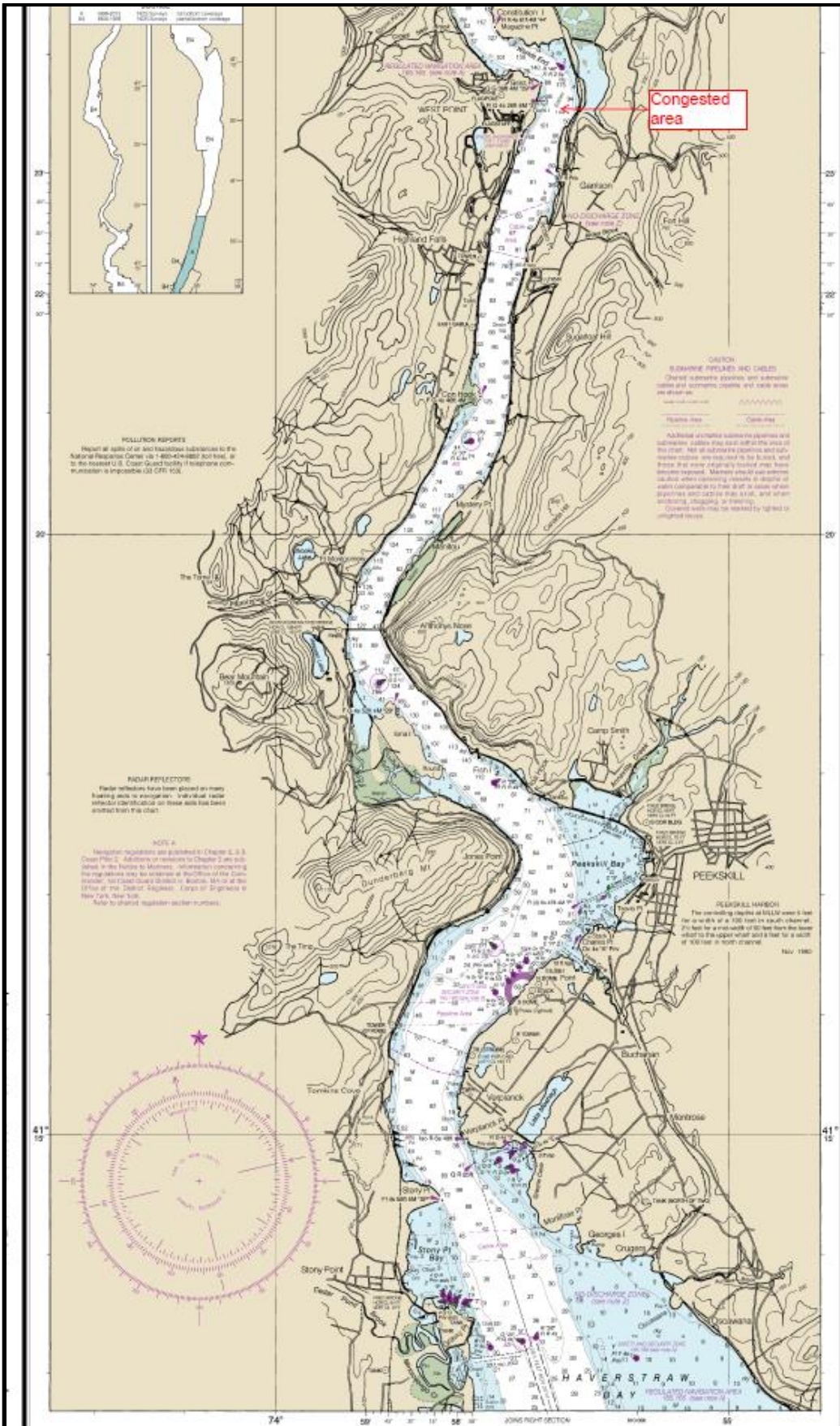
Hudson River - Wappinger Creek to Hudson
SOUNDINGS IN FEET - SCALE 1:40,000

12347

SOUNDINGS IN FEET

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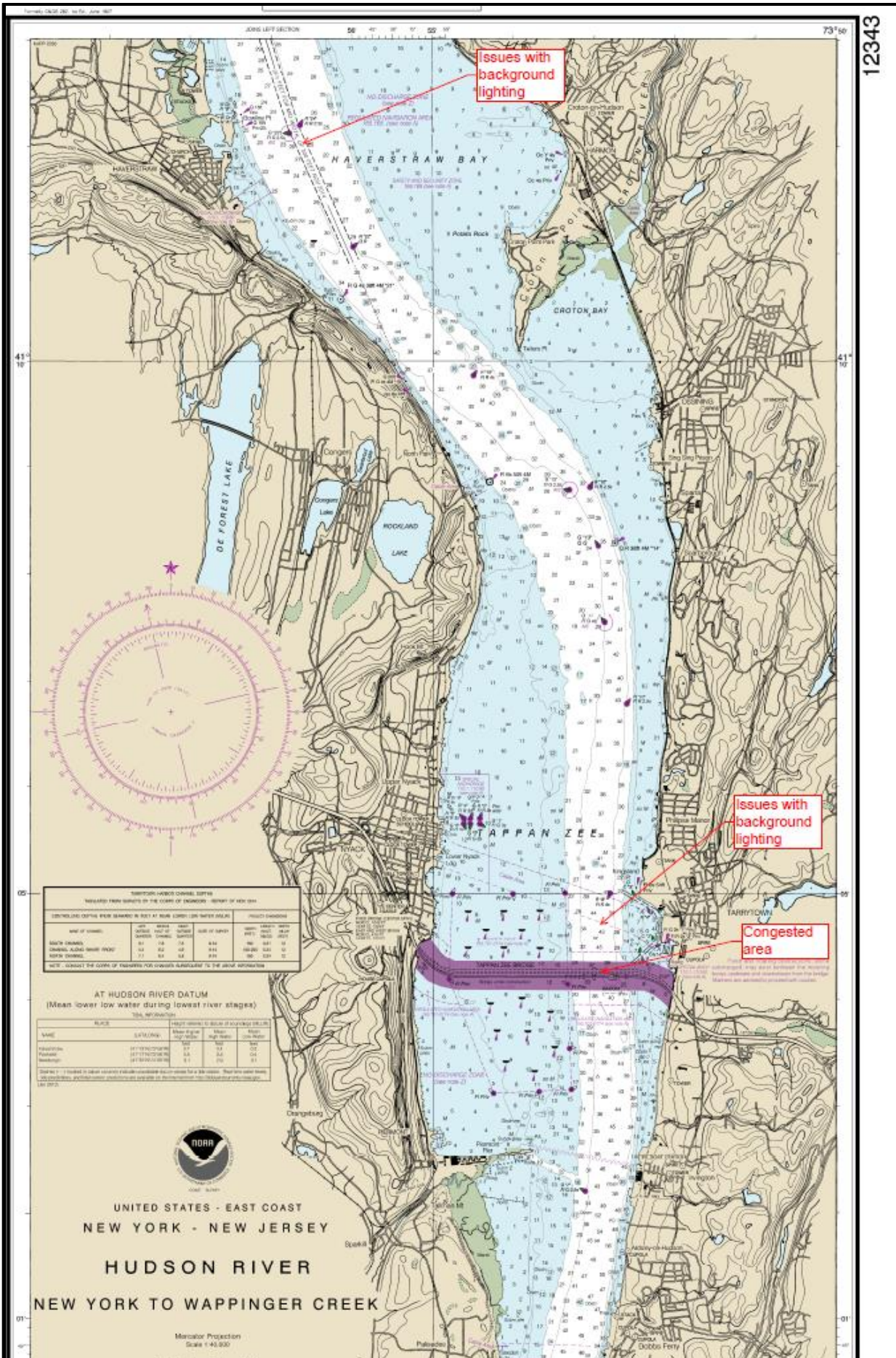




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20th Ed., Mar. 2013. Last Correction: 8/1/2017. Cleared through:
 LNM: 3817 (9/19/2017), NM: 3917 (9/30/2017), CHS: 0817 (8/25/2017)

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12343

Appendix H

References

Oil Company International Marine Forum (OCIMF)

<https://www.ocimf.org/>

Ship Inspection Report Program (SIRE)

<https://www.ocimf.org/sire/>

International Convention of Standards of Training, Certification and Watchkeeping (STCW)

[http://www.imo.org/en/About/conventions/listofconventions/pages/international-convention-on-standards-of-training,-certification-and-watchkeeping-for-seafarers-\(stcw\).aspx](http://www.imo.org/en/About/conventions/listofconventions/pages/international-convention-on-standards-of-training,-certification-and-watchkeeping-for-seafarers-(stcw).aspx)

International Marine Contracting Association (IMCA) Standards

<https://www.imca-int.com/>

Hudson River Comprehensive Restoration Plan

www.thehudsonweshare.org

New York State Boating Laws

<https://parks.ny.gov/recreation/boating/safe-boating/lawful-operations.aspx>

Environmental Research Consulting

<http://www.environmental-research.com/index.php>

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<https://www.navcen.uscg.gov/?pageName=vtsLocations>

American Canoe Association

<http://www.americancanoe.org/>

US Coast Guard - Vessel Inspection Regulations

<http://www.ecfr.gov/cgi-bin/ECFR?page=browse>

U.S. Army Corps of Engineers Regulatory Policies

<http://www.usace.army.mil/Missions/>

U.S. Navigation Rules

<http://www.navcen.uscg.gov/?pageName=navRuleChanges>

USCG Auxiliary -Requirements -Recreational Boats

<http://www.cgaux.org/boatinged/classes/2011/bss.php>

State-Specific Boating Safety Requirements

<http://www.americasboatingcourse.com/lawsbystate.cfm>

National Oceanic and Atmospheric Administration Safe Boating Weather Tips

<http://www.nws.noaa.gov/om/brochures/safeboat.htm>

Life Lines Brochure - Safety Tips That Could Save Your Life

http://www.americanwaterways.com/commitment_safety/lifelines.pdf

Recreational Boating Safety - Accident Statistics

http://www.uscgboating.org/statistics/accident_statistics.php

U.S. Army Corps of Engineers - Vessel Transit Statics

<http://www.navigationdatacenter.us/>

The American Waterways Operators

<http://www.americanwaterways.com/>

Appendix I

Abbreviations and Acronyms

ACP – Area Contingency Plan
AIS – Automated Identification System
ANPRM – Advance Notice to Proposed Rule Making
ATON – Aids to Navigation
BWI – Boating While Intoxicated
COTP – Captain of the Port
EPA – Environmental Protection Agency
GRP – Geographic Response Plans
GRS – geographic Response Strategies
HRSC - Hudson River Safety Committee
IMO – International Safety Management
MARAD – Marine Highway by the Maritime Administration
MTS – Marine Transportation System
MTSRU – Marine Transportation System Recovery Unit
NDG – National Dialogue Group
NEPA – National Environmental Policy Act
NMFS – National Marine Fisheries Service
NOAA – National Oceanic Atmospheric Administration
NYC – New York City
OCIMF – Oil Company International Marine Forum
OSLTF – Oil Spill Liability Trust Fund
OSRO – Oil Spill Response Organization
PAWSA – Ports and Waterways Safety Assessment
PCB - Polychlorinated Biphenyl
PDF – Personal Flotation Device
PSC – Port State Control
RNA – Regulated Navigation Areas
SIRE – Ship Inspection Report Program
SOLAS – Safety of Life at Sea
STCW – Standards of Training Certification of Watchkeeping
TMSA – Tanker Management Self-Assessment
TMSS – Towing Management Safety System
USACE – United States Army Corps of Engineers
USCG - United States Coast Guard
VHF – Very High Frequency
VTM – Vessel Traffic Management
VTS – Vessel Traffic Service